

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Machine for the Manufacture of Bricks, Compressed Fuel, etc.

We present upon this page three engravings of a new French brick machine, which is proving very successful. The machine is simple and strong, and can be run by a small amount of power. The machine is mounted on a cast iron frame *a a*, on which are four heavy pillow blocks *b b c c*, in which the two parallel shafts *d* and *f* work. The fast and loose pulleys *g g'* are placed on the shaft *f* and also the pinion *h* which gears into the large cog wheel *k* on the shaft *d*; the fly-wheel *k'* is fixed upon the shaft *f*. On the shaft *d* driven by the cog-wheel *h* are placed three cams *n n n'* and *i*. The latter, which is in the middle of the shaft, sets the compressing plunger *j* in motion. It is so shaped that it causes (1st) the bringing together and closing up of the material to be compressed; (2d) a short and very powerful compression; and (3d) the expulsion of the finished brick, or block. The cam *i* acts on the plunger *j* by means of the two rollers *k k'*. The two outside cams *n n'* act simultaneously on the two levers *d' d'* fixed to the frame at the points *d' d'*; the two other extremities are strongly fastened by means of bolts to a plate *d'* which serves to close the mold, and which, when raised, opens the orifice of the outlet for the brick or block to pass through. The clay or other material to be compressed is thrown with a shovel into the hopper which is placed above the plunger. The material, after being molded in *A* by the plunger, is discharged from the machine after the rising of the plate *d'* and the produce lies on the iron bars *o*, ready for removal; an opening through the plunger allows the surplus material to escape, rendering the pressure at the center and edges equal. The block on leaving the mold is pushed into a frame *q*, which by a slight up and down motion loosens it from the end of the plunger.

The insurmountable difficulty generally met with regard to equal filling of the molds here perfectly overcome by allowing more matter than is required to fall into the mold, which only retains sufficient to make the shape perfect, the superfluous matter escaping through an opening in the center of the compression piston, which brings the whole of the pressure on the angles in such a manner that the block comes out of the mold compressed in all points with sharp edges and perfectly rectangular.

All the motions take place slowly and smoothly without shock. The machine capable of turning out 10,000 bricks per day can be driven by a double horse-power. The simplicity of the machine and its great strength render it durable and little liable to derangements of any kind. The steel mold lining is about the only part which, even after long use, is likely to need repair.

like coal dust, peat, etc., for which it has been found very valuable, and for which it would be admirably adapted here. From 5 to 10 per cent. of coal, tar or pitch, well mixed with coal or coke dust, is sufficient to obtain blocks thoroughly solid and perfectly combustible.

## Labor and Wages in Great Britain.

The London Times says: Within comparatively few years we have had exposed to us in Parliamentary reports the degrading barbarity—it might almost be said, bestiality—of the conditions under which tens of thousands of our women and children were found to be employed in our brick fields, and even in agricultural labor. Little children from their earliest

nature are, after all, predominant over its baser impulses, and the higher class of pleasures cannot fail, under ordinarily favorable circumstances, to supersede the lower. Give uneducated men suddenly more money, and they will too, probably, squander it at first in an excess of the merely animal enjoyments which alone have hitherto been open to them. But they will not fall before long to discover that their increased wealth opens up to them more refined sources of enjoyment; a new world of intellectual and aesthetic pleasures will dawn upon them, and will gradually wear the better among them from their old impulses. The better men will influence the inferior, and a higher standard will gradually, but surely, be established. Such, Mr. Mundella states, has been

Mr. Mundella's testimony is, in fact, in accordance, as we believe, with that of every impartial observer who can remember the condition of the working class, or even of society in general, forty or fifty years since. We are in no way disposed to palliate or to underrate the evils which still prevail among us. But ask any cool judging man of mature years whether the tone of the class with which he is best acquainted be elevated or not, and he will not hesitate to assert that the improvement has been conspicuous. In every class, by no means excluding the working class, there is a higher standard of public opinion, and a tendency to throw off the vicious habits inherited from the past. There is, indeed, all the more need and the more encouragement to insist on the im-

provement, "has accustomed itself readily to the diets of many lands, but it never had a severer task than to keep up a moderate vital force on a basis of popcorn and withered figs. When I think of the cups of invigorating beef tea, the glasses of wholesome beer, the crisp biscuits, split to allow the insertion of a hot, broiled sausage, the appetizing cheese sandwiches, and the delicious pates in their paper nests, which are offered to the traveler in Europe, I wish we Americans were less ethereal and more physically sensible in our tastes. The saddest thing about the matter is—there is no protest. The typical American traveler, if he cannot swallow the peanuts, popcorn and withered figs, remains silent, hungry and cross. He never seems to guess that a vociferous demand for the right things would soon create a supply."

## The James River and Kanawha Canal.

The Philadelphia North American says: About one hundred years ago a project was advocated in Virginia for building the James River and Kanawha Canal. The scheme was undoubtedly older, and due either to those sons of Madoc who gave Welsh blood to the pre-historic Carolinians, or to stray Norsemen browsing about after they had been starved out of their round tower, where they could find nothing but Rhode Island clam bakes. It must have been as old as the oldest of these events, and judging by its greatest decrepitude, should have originated with the dim Anahauac and Toltec progenitors whose names, and family histories and worship and game laws Mr. H. Bancroft has deciphered from "Sermons in Stones" in lack of other authority and spiritual intuition. But the canal has survived time, history, Welshmen and Prutes, and is fighting its way as bravely in the Virginia Legislature as when the great grandfathers of the living legislators talked and adjourned. The Senate recently voted to finish grading the canal and then put a railroad into it. They were induced to repeal that act and allow a company to lease and complete the work to the Great Kanawha River in the West, and now it is said that the House will probably agree. Then this long discussion will end, or rather change into debates on the best method of paying interest on the bonded and floating debt. But it is cheering to see the Old Dominion so thoroughly alive; so courageous when despondency might be excused, and vigorously engaged in retrieving all its prosperity. Such efforts as this will do it, though perhaps the same amount of digging wasted on tobacco cultivation and railways would pay better. The glory of the canal will be that it is completed after a century of talk, and that it will be something if it never carries a boat.

In this era of railroad accidents it is pleasant

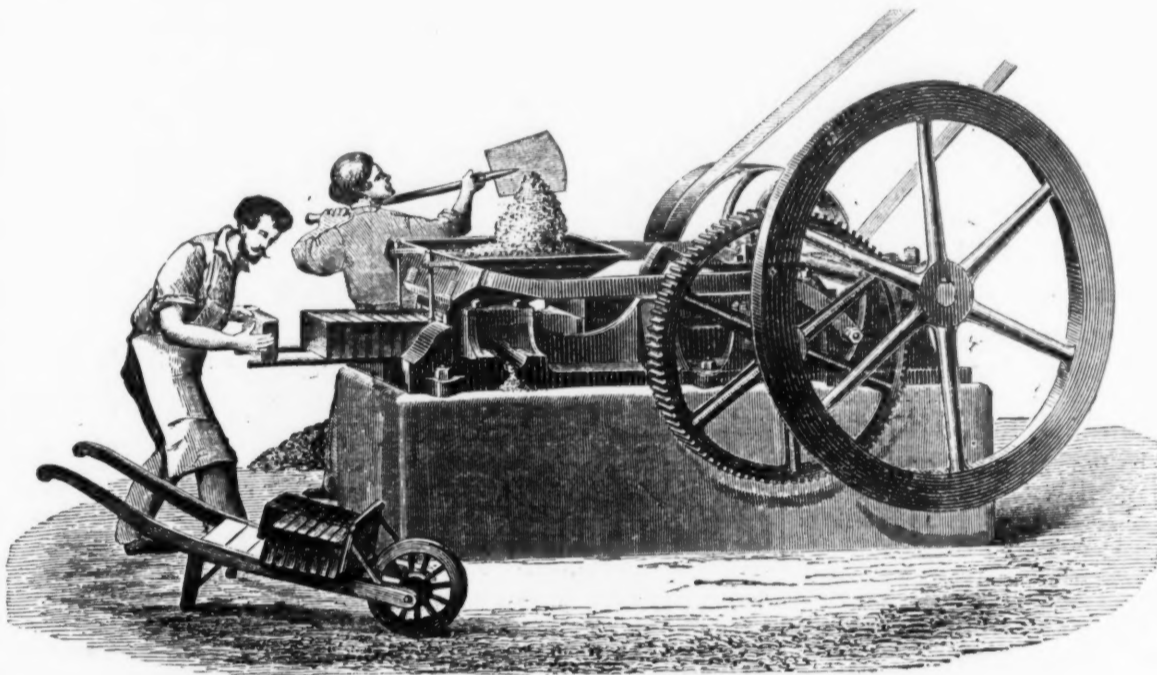


Fig. 1.

MACHINE FOR MANUFACTURING BRICKS, COMPRESSED FUEL, ETC., BY MESSRS. R. S. NEWBOLD & SON.

years were found to be treated like mere beasts of burden; women were employed under conditions utterly incompatible with the maintenance of the least respect for the decencies of their sex, while the men, of course, became simply more powerful animals. In our mines, within a recent time, the prevalent habits were, if possible, worse; and we might similarly refer to recent commissions to show the ferocious

the result of his observations and inquiries respecting the actual movement of thought and habit among the artisan class of the North. He quotes one remarkable piece of evidence. During the last two years there have been great depression of trade and great lack of employment. He finds that many men have had only two or three days' work in the week for the last two years. But, notwithstanding this,

provement which still, to an indefinite degree, need to be made. Mr. Mundella does not indulge in the cheap exaggeration of calculating the gross amount spent by the working class on drink, as though none of it, like the corresponding sums spent on meat and clothing, could be usefully expended. He is content to urge that they spend a vast deal "over and above the estimate of a reasonable man who

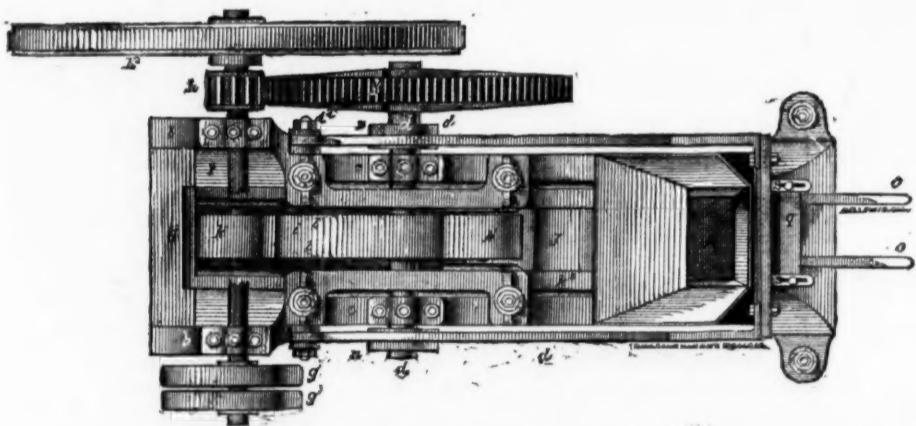


Fig. 2.—Plan of Machine.

About 10,000 bricks a day can be made, which can be baked at once because they are nearly dry; it realizes a considerable economy in working, no previous preparation being required. The ordinary machine produces bricks of 8 1/2 in. x 4 1/2 in. x 2 1/4 in. The prices of stronger machines increase according to the size.

Wm. Deacon & Son, of the Brookville Brick Yards, Lynchburg, Va., have one of these machines in use. They say of it, that they can take the clay right out of the bank, and find that, including saving expense of fuel and engineer, the cost is much less than a hand-made product. Another firm say that the bricks made from tempered clay can be baked at once 8 high.

Messrs. R. S. Newbold & Son, Norristown, Pa., the sole manufacturers for the United States and Canada, have made a machine for the Union Mining Co., of Mt. Savage, Md., the manufacturers of the Mt. Savage fire brick. They are also making other machines for several other brick makers. The price of the machine is low, bringing it within the reach of those with even limited means.

The French manufacturers, F. Duranl & Marais, of Paris, have paid much attention to the use of the machine for compressing fuel,

customs which very recently prevailed in some of our most important manufacturing towns. All these things are on record, and we do not need Mr. Mundella's evidence in support of them. But his experience renders us the service of bringing them into the field of view, of reminding us that they are all within the compass of one life's observation, and that this terrible past is still an element in the present. Is it reasonable, as he asks, to expect the first generation which escapes from the degrading necessities of the past, to escape, at the same time, without delay, from its degrading habits? It is not much wonder, certainly, if among men whose fathers had no other idea of spending an excess of money than that of indulging in some sensual enjoyment, the first access of higher wages could elicit similar tendencies.

Such considerations go far to explain, and even to excuse, some of the abuse of prosperity which has undoubtedly been witnessed among certain sections of the working classes. It has been often said, and with some truth, that their hour of prosperity came on them before they were sufficiently educated to make a good use of their increased resources. But it was a mistake to assume that this incapacity would continue. The better impulses of human

there has been a steadily decreasing pauperism, and, allowing for all subsidiary causes, this cannot but indicate that working men have become more saving than formerly, and are better prepared for times of depression. There are, he says, similar indications of an elevation in tastes and habits among them. He was recently invited to the annual meeting of the Co-operative Society of the valley of Rosendale, and he was surprised to find that in the store there was a department for musical instruments. Upon making inquiries, he was informed that in a considerable portion of the houses of the spinners and weavers in the valley there was to be found either a pianoforte or a harmonium. The simple truth is that people are much happier when they live clean, sober, gentle lives, when they can adorn their homes and relieve their leisure with some of the graces of life; and it is only natural, and, therefore, inevitable, they should sooner or later turn their improved opportunities to account for the purpose of enjoying these advantages. It increased prosperity encourages luxury, it fosters also ideas of more civilized, more cultivated, more intellectual ways of life; and if it is liable to temporary abuse, the evil tends to work its own cure.

was prepared to make a pretty full allowance for the drink which might be taken with advantage." Appeals to good sense urged with this moderation will not fail to take effect; and Mr. Mundella addresses a still stronger and not less wholesome instinct in English workingmen when he exhorts them, above all things, to depend upon themselves, instead of looking to the State for protection and assistance. Independence, alike of character and of position, is the best and most prominent feature in English life, and it has a charm about it which, as Burns's famous verse shows, has already fascinated the imagination of the working class and will fascinate it still more. There is very much, in a word, to be done, but it is none the less true that very much has been already done for the elevation of the poorer classes in this country; and such a speech as Mr. Mundella's shows that they possess advisers fully capable of entering into all their difficulties, and able to afford them sound and encouraging guidance.

Bayard Taylor's been having a hard time of it on the New York Central, dragged back and forth between snow-banks, and fed on what the train boy brought in. "My stomach," he ob-

to note that a Cleveland "professor" has invented a safety car. In the event of an accident, all the engineer has to do is to pull a peg, and the sides, ends and tops of all the cars on the train instantly fall out, the doors fly open and the windows go up with a slam-bang that wakes up any chance passenger who has fallen asleep. To a prejudiced person the car seems to lack but one thing, and that is an automatic grapnel which shall seize the unfortunate passenger, who is rolling in a ditch below, hoist him to a position of ease on the track and there bathe his shattered limbs with arnica, until he recovers and claims his accident insurance money. The Cleveland safety car is, without doubt, the long sought "balm of Gilead" for transportation purposes.

A German physiologist states that the heating of the earth by the sun causes magnetic currents from the equator to each pole. Such being the case, persons who suffer from sleeplessness should pay attention to their position at night, and lie in the direction of these currents. Restlessness and want of sleep result from lying across them. The head to the North is the best position—to the West the worst. Physicians in charge of hospitals attend to the directions in which the beds are placed, and with the best results.

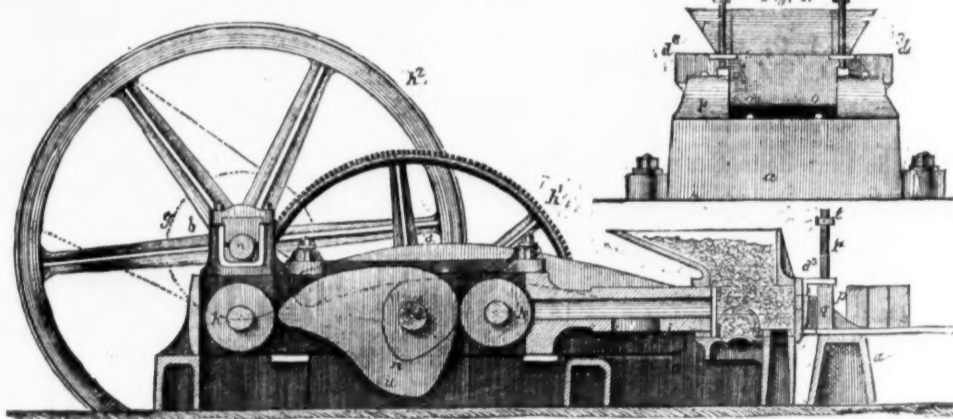


Fig. 3.—Longitudinal Section.

Fig. 4.—Elevation of End.

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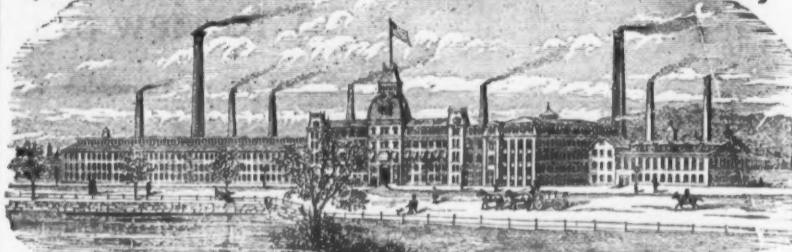
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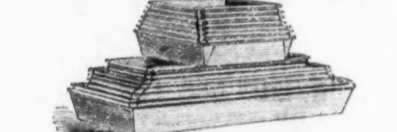


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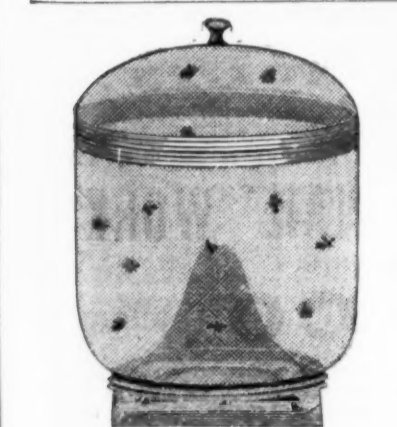
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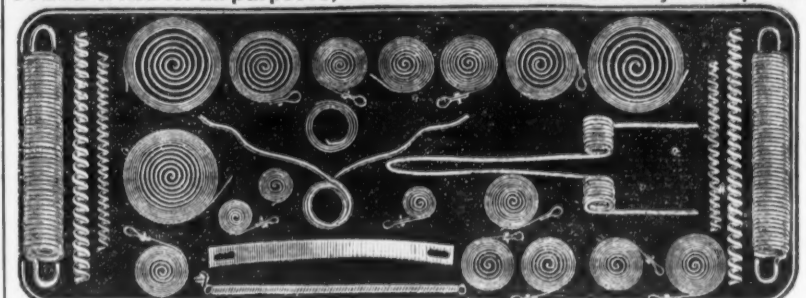


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**THE IRON AND HARDWARE TRADES OF FRANCE.**

Abstract of Report by Mr. Frederick Brittain to the Associated British Chambers of Commerce.

(Concluded.)

In 1860, when French manufacturers in general were loudly denouncing the treaty, the ironmasters were pre-eminently the rigor with which they attacked the policy of the government, and the confidence with which they predicted disaster to the French trade. In one sense they were right, for they have been compelled to reduce their exorbitant prices, and today French iron sells in Paris at the price at which English iron sells in London.

The duty of £2.8 per ton is decidedly more prohibitive in 1876 than the duty of £9 per ton was in 1851, and the imports of iron into France are now smaller than they were 25 years ago.

Monsieur Ame states that the price of iron bridges and other great works of a similar character has fallen during the last ten years from £40 to £22 per ton.

The progress recently made by France in the manufacture of hardware has equaled that made in the production of iron, and it will be difficult to justify the retention of the present high duties, which, in some cases, represent 40 per cent.

The duty upon iron is 45 per ton, which is equivalent to 31 per cent. upon the present price of French iron in Paris. Upon machines various rates are charged, but upon the greater part the duty is £4 per ton, which restricts their sale.

The duty upon wood screws and nuts and bolts is 64 per ton. As the value by weight of these articles varies according to size, it is difficult to fix the percentage rate, but upon the large kinds of nuts and bolts it reaches 20 per cent., which is completely prohibitive. Upon ferronnerie, which includes the commonest ironwares, the duty is 64 per ton, which sometimes represents 25 per cent.

Steel is charged at the rate of 72 per ton for bars and 90 and 120 for sheets, according to thickness. These rates are equivalent to about 20 per cent. on common qualities.

Fils, saws and tools made of steel are taxed at the rate of £3 per ton, which is moderate upon the lighter articles, but oppressive upon heavy common goods, sometimes representing 15 per cent. upon them.

While English goods are thus heavily taxed in France, identical articles of French make are admitted into England free of duty, and are sold now retail in the ironmongers' shops in Birmingham, and wholesale at the depot in the same town.

The only article of Birmingham or Sheffield make that appears to have met with decided success in France is iron tubes, and it is to be feared that the extravagantly high duty still imposed upon them will encourage the creation of a manufacturing interest which will in the near future clamor for protection.

The duties are now as follows:

Upon all lap welded tubes and butt welded tubes of a smaller bore than three-eighths of an inch, £3 per ton.

Upon butt welded tubes of three-eighths of an inch bore and above, £4.8 per ton.

These duties represent in some cases 40 per cent. of the value, and will, if not reduced, eventually destroy the trade now done by English makers with France.

The following figures show the total imports of iron tubes into France for home consumption, and also the proportion contributed by England:

	1859.	1864.	1869.	1873.	1874.
From all the world.	477	1,037	2,409	2,302	2,467
Of which England supplied.	442	1,034	2,363	1,748	2,224

As the classification of tubes causes frequent disputes at the Custom House, it would be a great advantage to have one rate of duty, and that rate ought to be considerably lower than the minimum now imposed, which bears no proportion to those levied by other continental nations.

The following table, which is based upon the French customs returns, shows the exports from France and the imports into France, of several articles of iron and steel, and the duties levied upon them:

	Duty per ton in France.	Exports to France from France.	Imports to France from France.	Imports to France from foreign countries.
	£ s. d.	Tons.	Tons.	Tons.
Forged nails, wood screws, nut and bolts.	3 4 0	14,128	20,319	45 529
Tools, saws and files.	3 16 0	1,456	1,807	1,168 1,440
Ironware, Ferronnerie.	3 4 0	15,811	12,156	1,473 1,471
Locks, latches, &c.	4 16 0	1,532	2,096	34 24
Household articles and other articles in iron not enumerated.	various.	12,891	9,340	566 675
Cutlery—value.	15 per cent.	104,438	114,494	14,102 12,819

In 1874 the value of the cutlery exported from France was £114,494, while the value of the imports only reached £12,819, but French manufacturers who are now protected by a duty of 15 per cent., *ad valorem*, are still dissatisfied, and the Conseil Supérieur du Commerce recommends the adoption of the following specific rates:

Upon fine cutlery, 5 francs per kilogramme.  
Common cutlery, 3 francs.  
Common razors and butcher and cook knives, 1 and 2 francs per kilogramme.  
Common table knives, which weigh about 700 grammes per dozen, may be bought at Thiers at 2 francs 75 cents per dozen, and at Sheffield for the same price—namely, 2/2½d. Upon these knives the duty suggested would be really 75 per cent. It is true that the bulk

of the cutlery imported into France is of better quality, but if the suggestion of the Conseil Supérieur were adopted the average duty would be immensely augmented.

In 1873 the weight of cutlery exported from France was 386,811 kilogrammes, and it was valued at 2,610,974 francs, which gives 6 francs 75 cents per kilogramme.

In 1874 the weight was 394,807 kilogrammes, and the value 2,862,351 francs, which gives 7 francs 25 cents per kilogramme.

In the same years the average value of the cutlery imported into France was given at 6 francs and 6 francs 50 cents per kilogramme. The proposition to convert the present *ad valorem* duty of 15 per cent. into specific duties, calculated upon average prices reaching 20 and 35 francs per kilogramme, appears remarkable in the light of these figures.

There is no article that gives more trouble to the Custom House than cutlery, and the amount yielded by it in duty, notwithstanding the high rate, is too insignificant to be worth collecting. In 1873 it was just over £2000, and in 1874 it was a little under £2000.

The value of the cutlery exported from England to France for home consumption has been as follows:

In 1864	£7,645
In 1869	£7,841
In 1873	£7,220
In 1874	£7,220

While French manufacturers have been protected by high import duties, they have been stimulated by an ingenious but pernicious system of premiums upon export. Thus, under an *acquits-a-caution*, a maker of iron goods at St. Etienne could obtain a *pouvoir* to import, duty free, the iron which he required for his export trade, but he frequently found that English iron cost him, at St. Etienne, a higher price than French iron, so he disposed of his *pouvoir* to a speculator who again sold it to an iron merchant in or near a seaport town where English iron was cheaper than French. A regular traffic was carried on in these *pouvoirs* and their prices publicly quoted. During the years 1867-69 219,591 tons of pig iron were imported duty free under *acquits-a-caution*.

In 1867, when iron paid 6 frs. per 100 kilos, a *pouvoir* cost 2 frs. 25 cents, and with the duty of 13 frs. upon steel, a *pouvoir* could be obtained at 4 frs. per 100 kilos.

The *acquits-a-caution* represented really a direct premium paid to French manufacturers of iron goods. M. Schneider stated in evidence before the Commission of Inquiry, in 1867, that it represented 5 per cent. on all the cheap work produced at the Creusot for exportation. A very large part of the iron and steel that passed through the Custom House duty free under an *acquits-a-caution*, which implied an undertaking that it would be re-exported in the shape of finished goods, entered by the northern ports, and was sold to iron merchants for their ordinary trade; whereas nearly all the wares, for which the iron and steel admitted *en franchise* was supposed to supply the raw material, were exported from southern ports or by land, and were made of French iron or steel, which were cheaper at the manufactories than the same qualities of English make.

Recognizing the evils inherent in the system, the French government appointed, in 1867, a committee to inquire into its effects, and remarkable evidence was produced before it which resulted in the decree of January 9th, 1870, by which the temporary admission of iron, etc., was regulated. It is unnecessary to refer at length to the change which was then made, as it was simply suggested in the interest of the French Treasury and of French ironmasters.

It is impossible to conceive the disaster that would befall France if England went back to the duties which were in force in 1859, or imposed the same duties upon French produce that France imposes upon English.

It is free trade in England that has made the wealth of France, for it is here that she found a free and magnificent market for her diversified produce.

Although we have reason to ask that the future tariff of France shall be more consistent with the principle of our own, we have no cause to regret the past.

**Machine-Made Horseshoes in France.**

—M. Lockert read, on January 19th, a paper before the Paris Civil Engineers' Association, on the Thuillier and Dumont system of mechanical horseshoe making. In ten hours, with one set of apparatus, eight workmen turn out 3000 complete horseshoes; at the Esperance Forges (Louvrol, near Maubeuge, dep. Nord), there are four sets of apparatus, and the total make therefore is 24,000 per diem, equal to the work of 800 farriers working by hand. It is estimated that France possesses 5,500,000 horses, mares, mules, &c., each animal consuming on an average forty-eight shoes per annum, the total annual consumption being thus 160,000,000 shoes, which, at an average weight of 1½ lb., gives a consumption of over 125,000 tons of iron a year. At Joinville-le-Pont is another shoemaking forge; and in the discussion which followed the reading of the paper, it was stated that studies were on foot in France with the object of bringing out an apparatus superior in efficiency and simplicity to that described by M. Lockert.

The Cambridge University have resolved to petition against the Great Northern Railway Bill for extending their line from Shephth to March, as it will come so near their observatory as seriously to affect the accuracy of the observations, or even cause their entire loss. The instruments would be shaken from their proper position by the vibration.

Peroxide of manganese occurs widely in ocean deposits, either as nodules, incrustations, or as depositions on the bottom itself. It has been found most frequently in the nodular form in the deep sea clays far from land. It also occurs in the organic oozes, when these contain much volcanic debris, or are near volcanic centers.

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Yours, respectfully,  
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Our Rolling Mill and Nail Factory having been remodeled, possess all modern improve-  
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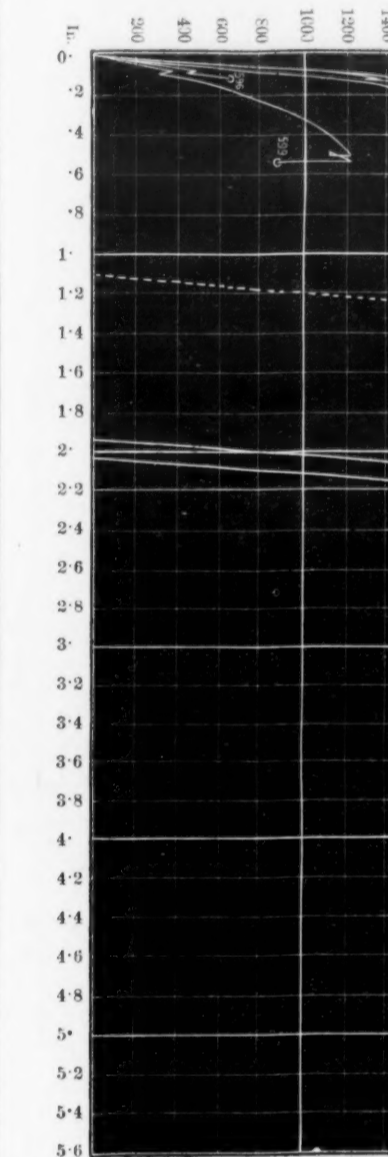
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**Otto Stietz N. Y. Glass Letter Co.,**  
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Advertising Glass Signs a specialty.

**Behavior of Metals under Strain.**

At a recent meeting of the American Society of Civil Engineers, Prof. R. H. Thurston prefaced a lecture "On the Measurement of Train Resistance on Railroads by the use of Recording Dynamometers" by a brief description of interesting and important researches which he was then conducting in the Mechanical Laboratory of the Stevens Institute of Technology, and which had resulted in the discovery of the "elevation of the elastic limit by strain," which he had already found in tension, and by the autographic strain diagrams with which the readers of *The Iron Age* have become familiar in experiments on transverse strength of metal. He had further discovered a depression of the elastic limit by strain in metals of viscous character, of which tin was taken as a type.

In illustration of the peculiar characteristics of the two classes into which he has proposed to divide all metals used in construction, the speaker sketched on the blackboard strain diagrams produced by plotting on paper the records of experiments on a ductile metal, a very rigid and brittle metal and a bar of ordinary merchant iron.

The accompanying figure represents with tolerable exactness these three strain diagrams. Their resemblance to the autographic diagrams which we have published already, is seen at a glance.



STRAIN DIAGRAM OF FOUR BARS OF WROUGHT IRON, AND TWO OF COPPER-ZINC ALLOYS TESTED WITH TRANSVERSE STRAINS, BY PROF. R. H. THURSTON.

fully described in our columns. An hour or two was usually time enough to bring out this remarkable phenomenon.

The speaker stated that this action had now been discovered in iron and steel, and under every form of strain—tension, torsion, compression and cross-breaking—and it would seem that aside from accidental overstrain, producing incipient rupture or loss of strength, due to such action as abrasion or corrosion, length of life of iron structures under strain was in itself, apparently, a source of increased safety.

The bars No. 649, 650 and 651 were tested by rapidly increased load up to the breaking point, allowing no time for reading of sets.

The first of this set deflected 0.014 inch under 100 lbs., 0.052 under 500 lbs., 0.098 under 1000 lbs., and 0.18 under 1500 lbs. At 1600 lbs. the deflection was 0.284 inch, and the bar yielded to the stress, and the deflection became 0.363 in 2½ minutes. Under 1640 lbs. the deflection increased in six minutes from 0.383 to 0.440 inch, and a maximum resistance was recorded of 2350 lbs., and a deflection of 5.577 inches. This bar was tested in a similar manner to the preceding, and in the same machine.

Numbers 650 and 651 were tested by dead loads—i. e., by laying upon them heavy weights. By this method the deflection could increase to a maximum under each load, instead of being kept constant, as in the testing machine. No. 650 was rapidly broken without allowing time for completion of set or any considerable exaltation of the elastic limit. The plotted curves of results exhibited well the striking difference of behavior between this bar and 651, which was purposely given time for set and for exaltation of the elastic limit.

At 1500 each had deflected nearly the same amount, and had passed the elastic limit, as usually called. The first, however, gave way completely with 2350.5 lbs., while the second, after several times exhibiting an elevation of the elastic limit—as at 1500, 1600, 1700, 1900, 2300, 2400 and at 2500 lbs.—finally only yielded

These have been tested with great care upon a machine made expressly for such work by the Messrs. Fairbanks, and the deflections were measured by an instrument made for the Mechanical Laboratory of the Stevens Institute of

[Continued on page 6.]

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**JAMES ROWLAND & CO.,**  
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**BEST REFINED IRON.**  
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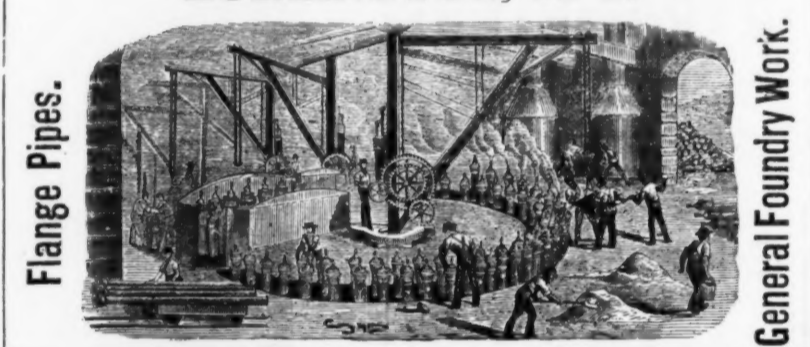
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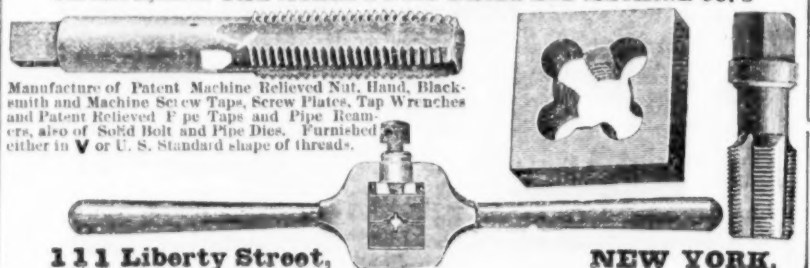
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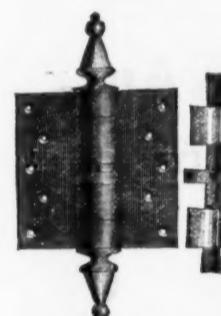
67 Kilby St., Boston, (Pumps.)

Henton & Denckla, 507 Com-

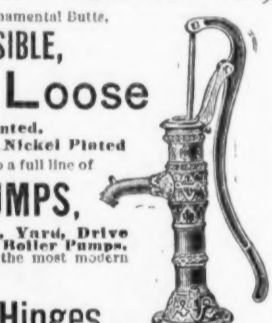
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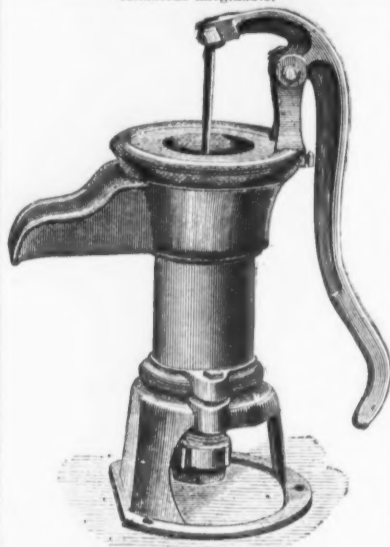
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easily replaced, without sacrific-  
ing the whole pump. They  
can be immediately converted  
from right to left-hand pumps,  
by switching the air-chamber  
and handle to any required  
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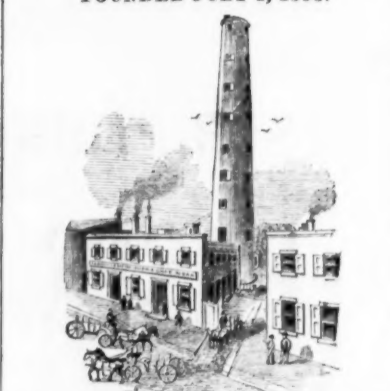
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Trade supplied.



## The Use of Vacuum Chambers on Suc- tion Pumps.

Comparatively few persons outside of the  
class of regularly educated engineers and those  
engaged in the manufacture of steam pumps,  
are aware of the value of the vacuum chamber  
as applied to suction pumps operated either by  
hand or power. While of positive advantage  
to a double action pump, it is so indispensable  
to those with a single action that a regular  
motion cannot be obtained without it, or any  
approximation thereto, so far as the flow of  
water is concerned. As there are so many  
steam pumps of varied excellence in the mar-  
ket, from the Worthington duplex down the  
sliding scale of quality, it is not necessary here  
to speak of the various mechanical devices used  
to produce the desired results by their respec-  
tive makers, but to simply confine this article  
to the action of water while passing through  
the suction pipe to the pump. Assuming that  
no suction pump can be doing its best work  
when unprovided with a vacuum chamber, we  
will state the difficulties to be contended against.

Taking a hand pump for illustration, we find  
that the inertia of the water is to be overcome  
afresh at each stroke of the pump, or, in other  
words, at each stroke of the plunger the water  
must receive a jerk from a dead point. It  
starts forward and stops with a thump, con-

hung on springs. The parallel is in no wise  
exaggerated. The vacuum chamber is equal-  
ly desirable for force pumps, and are very gen-  
erally appreciated in that capacity under the  
name of air chambers. Of these, however, we  
will only assert their equal advantage if put on  
the rising pipe. If we throw a stone to the  
ground we must stoop to pick it up, but a rub-  
ber ball returns to our hand. The convulsive  
action of the water is here utilized as a force to  
aid our work.

A suction pump should always have a  
vacuum chamber, and a force pump an air  
chamber, and when these two pumps are com-  
bined the rule still holds good, either for power  
or hand pumps. The Worthington duplex, the  
highest type of steam pump, and which can  
best afford to do without either, has them  
both.

## Hydraulic Forging.

Mr. J. H. Johnson's patent for the shaping,  
welding and upsetting metal, relates to the  
hydraulic mechanism employed for actuating  
the shaping and welding die and the upsetting  
ram and consists: (1) Of means for operating  
the same in such a manner as to avoid the  
frictional resistance incident to the opening of  
the die when closed by mechanical power; and  
also of a means for locking the die when closed,

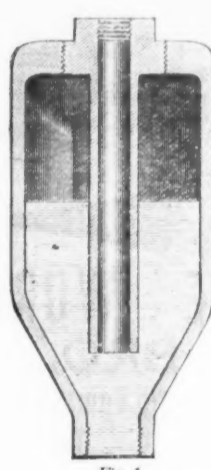


Fig. 1.

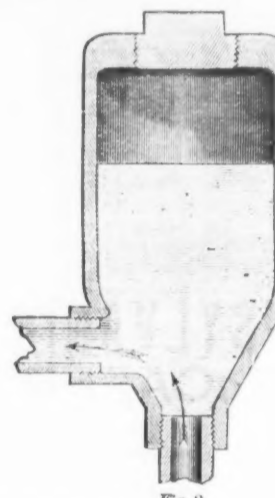


Fig. 2.

VACUUM CHAMBERS FOR SUCTION PUMPS.

suming much power, tiring the arm and creat-  
ing a severe strain on the pump and pipe, for  
water does not readily cushion its own blows,  
being practically without elasticity. Then,  
too, there is the friction of the water to be  
overcome, and in many cases an additional  
difficulty is created by the suction pipe being  
too small for its purpose—often the result of a  
mistaken economy, but more often the result  
of ignorance. Many an unfortunate plumber  
has exhausted his ingenuity in trying to stop  
"the kicking" of a pump handle, on a pump  
cylinder of 2 1/2 inches in capacity, vainly try-  
ing to supply itself from a 1/2 inch suction pipe.  
By applying a vacuum chamber close under  
such a pump, the trouble will be found to have  
almost entirely disappeared. The pump works  
smoothly, easily and silently, and the water is  
delivered with a more uniform flow. There  
are two forms of vacuum chambers, varying  
in shape to suit location, but both governed  
by the same general laws. The two shown  
herewith are made by the Nason Manufacturing  
Company, 71 Beekman street, N. Y.

Fig. 1 has a straight water way through it,  
and is intended to be placed as close under the  
pump as is practicable. Fig. 2 is a corner  
vacuum chamber, and is of best use alongside  
of the pump on the suction pipe. Its action  
can be briefly described as follows:

When the pump is operated the air in the  
vacuum chamber becomes rarified or partially  
exhausted so that when the water arrives  
through the suction pipe and supplies the vac-  
uum thus formed in the chamber, the remain-  
ing air resumes its normal density of 15 lbs. to  
the square inch and occupies the upper part  
of the chamber, and the water fills the lower  
remaining space. Upon the further working of  
the pump the vacuum produced by its plunger  
is instantly felt by this water which, thus losing  
its support, falls by its own gravity, and as it  
cannot return through the suction pipe on ac-  
count of the advancing column of water which  
is being sent forward by outside atmospheric  
pressure, it rises to its own level in the rising  
or interior pipe, as the case may be, and is still  
further assisted by the air in the chamber,  
which, having its pressure removed, expands  
proportionately with its pressure of 15 lbs.,  
more or less, and forces the water to fall lower  
in the chamber and to rise still higher toward  
the pump through the pipe; then, as the pump  
ceases its stroke for an instant, the advancing  
water again compresses the air to its normal  
density by filling the chamber, and before it  
can lose its momentum the stroke is repeated  
so that the inertia of the water is completely  
overcome, a steady flow assured to the pump,  
therefore easing its work, saving the wear and  
tear to a large extent, and doing away with the  
convulsive action in the suction pipe, as the  
water does not stop and start with each stroke  
of the pump as it must do when no vacuum  
chamber is used, but flows steadily to the  
pump. It is strictly true that no suction pump  
can be doing its best work without its vacuum  
chamber.

If we apply the foregoing facts to the work-  
ing of a steam pump, whose motor tells no  
tales and makes no complaints of hard work,  
we can at once see the saving of the material  
of the pump from strain and shock which its  
restless motor gives it when the laws of na-  
ture are disregarded. We all know the differ-  
ence between a ride in an ox cart and in a cart

so that a pressure within greater than that  
required to close it will not open it, and for  
unlocking it with such increased pressure with-  
in the die without exerting any appreciably  
increased power over that required to lock it.  
(2) Constructing hydraulic drawbacks to be  
employed in combination with the shaping and  
welding die and the upsetting ram, with two  
passages or conduits, one of which connects  
the inner end of the inner cylinder with the  
back end of the drawback cylinder, while the  
other connects the inner end of the drawback  
cylinder with the accumulator or with the  
pumps. (3) In combining with the shaping  
and welding die and upsetting ram, an apparatus  
consisting of a holder and a clamp for holding  
bars of metal as close as practicable to the die  
against the pressure required to upset them,  
such apparatus being operated by hydraulic  
power, which may be regulated according to  
the work to be performed. (4) In con-  
structing and arranging the hydraulic accumu-  
lators to be employed in combination with the  
said machinery or apparatus in such a manner  
that easy access may be obtained to the whole  
of the moving parts, and packing and facility  
afforded for the safe and rapid removal and  
replacing of the weights. (5) Of improvements  
in hydraulic machines, to be employed for the  
before-mentioned purpose, of that class in  
which the power is produced by a continuously  
operating pump, and applied through other  
mechanism operating intermittently, the object  
of this part of the invention being to maintain  
the pump in continuous operation and ready to  
meet the demands upon it, and to relieve it at all  
other times, and while thus relieved to main-  
tain a circulation of water through the pump  
chamber in combination. (6) Of improve-  
ments in the application and regulation of  
hydraulic power in that class of  
hydraulic machine referred to under the  
fifth head of this invention, such improve-  
ments consisting in combining with the valves  
of the pump a system of levers and weights so  
arranged and operated that the defined move-  
ments of the mechanism determine the direc-  
tion of the pressure upon the pump; also in  
interposing between the inlet and outlet valves  
of the pump, a supplemental valve which, when  
closed, will be held to its seat by the pressure  
within the pump chamber, and when open will  
permit the free escape of the fluid from the  
pump chamber in such a manner as to prevent  
any accumulation of air therein; also in the em-  
ployment of a system of levers and weights for  
regulating the speed of the pumping en-  
gine.

An English "noble lord," who is also a coal  
operator, is said to be about trying the experi-  
ment of Chinese cheap labor at his colliery.  
The London Examiner gives its guarded ap-  
proval, but, mindful that English workmen  
are prone to make trouble if they think their  
rights are interfered with, expresses a fear that  
"there will be considerable disturbance regard-  
ing the matter on the noble lord's mining  
ground." "Even the freest of free traders,"  
says the Examiner, "will not support the intro-  
duction of Chinese customs if they turn out  
to be nothing better than a moral nuisance, as  
they are declared to be by both Australian and  
Californian settlers." Nevertheless, it is will-  
ing to give John a fair trial, and that is rather  
more than John asks. Give him a foothold  
and he will take care of himself.

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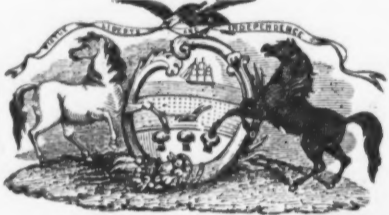
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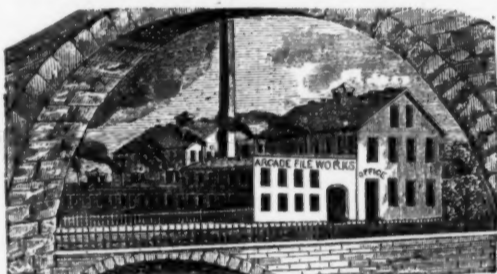


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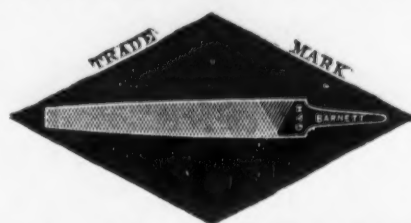
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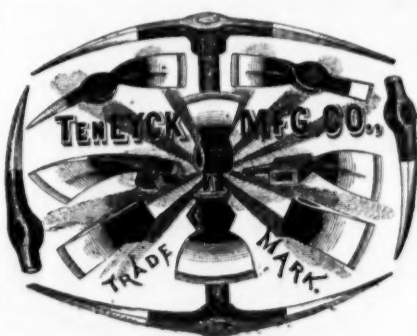
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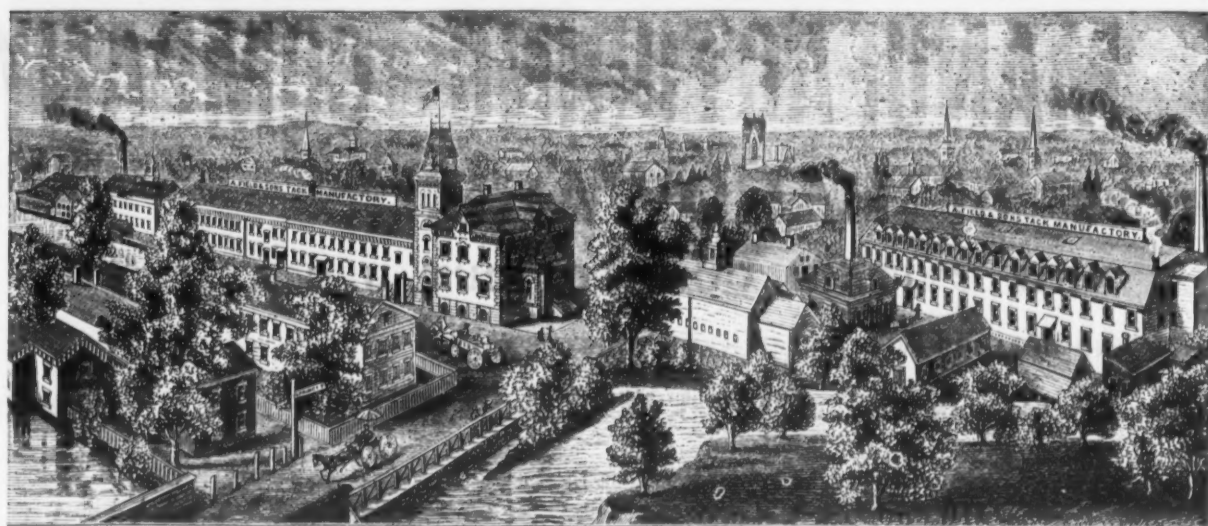
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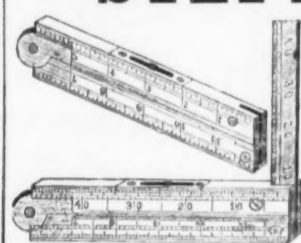
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**L. C. Stephen's Patent Combination Rule.**



Rules graduated in foreign measure to order.

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**JOHN I. BROWER & SON,**

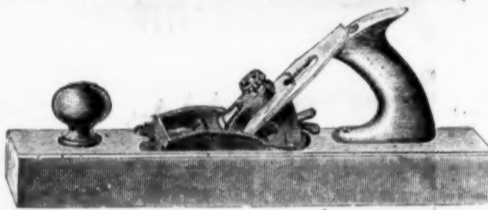
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Burden's Horse Shoes,  
Perkin's Horse Shoes,  
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American Screw Co.'s Screws,

Heller & Bros. Horse Rasps,  
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**STANLEY RULE AND LEVEL CO.,**  
Manufacturers of IMPROVED CARPENTERS' TOOLS.

Factories,  
New Britain,  
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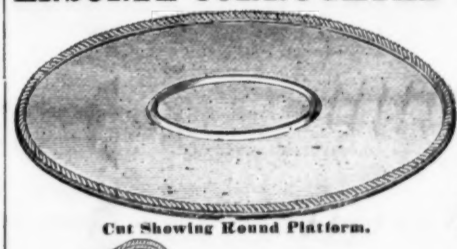
Warerooms,  
35 Chambers  
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No. 129, Fore Plane, 20 inches in length, 2 1/2 inch Cutter. \$2-25.

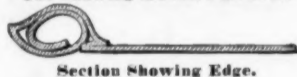
**ANSONIA CORRUGATED STOVE PLATFORM**

Manufactured by the

**Ansonia Brass & Copper Co.**  
Office, 19 & 21 CHURCH STREET,  
NEW YORK.



Cut Showing Round Platform.



Section Showing Edge.

The Ansonia Corrugated Stove Platform, with its heavy figured edge border, is believed to be the best Platform offered to the trade. As shown in the illustrated section herewith it requires no nailing to keep it in place or to prevent it from turning up at the edge; while the metal is of sufficient thickness to require no lining. The low price, superior quality and fine finish of this Platform will be readily acknowledged. Packed 100 in a case. Send for price list.

**LIST PRICES REDUCED.**

**DARLING, BROWN & SHARPE**

Providence, R. I.

MANUFACTURERS OF

**United States Standard Steel Rules,  
HARDENED CAST STEEL TRY SQUARES,  
STANDARD WIRE GAUGES,**

AND

**TOOLS FOR ACCURATE MEASUREMENTS.**

New Illustrated Catalogue, issued March 1, sent per mail  
on application.

[Continued from page 5.]

### Behavior of Metals under Strain.

entirely at 2589. The first only deflected 2 1/2 inches; the second, 4 1/2 inches, although when the latter was loaded with about the weight which the first yielded, deflected about the same amount.

The last bar was left 3 1/2 days under its final load, and its deflection increased from 4 1/2 inches to 4 7/8, when the weights reached the supports of the frame and the test was ended. The other bar sank rapidly after being loaded with 1600 pounds.

Both classes of metals when flexed were shown to exhibit less and less effort to restore themselves to their original form. In the case of the tin class this continues indefinitely. With the iron group this loss of effort gradually becomes less and less and reaches a limit at which the bar is found to have become stronger than at first. The two classes are thus seen to be affected by time in precisely opposite ways.

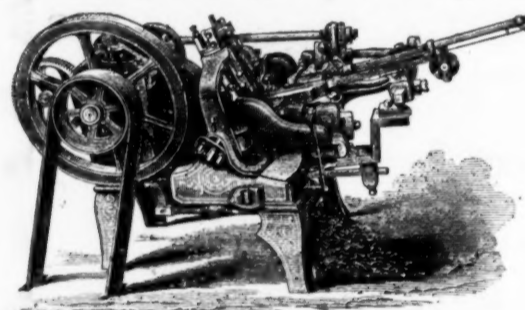
In some experiments on alloys, bars held flexed but perfectly still were observed to emit, by the hour together, a peculiar crackling sound, like the "cry of tin," without giving any evidence of fracture. The experimenter adduced this as evidence to the senses of the occurrence of intra-molecular movements to which he had attributed the peculiar phenomena above described.

The speaker promised to make this set of experiments the subject of a note to be published in the transactions of the Society, in which all data should be given with minuteness of detail and accuracy. We have given our readers an outline of this account, and for all practical purposes, a sufficiently accurate statement of figures subsequently obtained from the speaker. The importance of the knowledge here obtained of the behavior of metals under strain will be fully appreciated by every one who is engaged in construction; and the value of these facts as corroborating the opinion expressed many years ago by the late Mr. Roebing, destitute as that opinion was of a positive basis, that iron structures properly designed and built and well cared for are safe, whatever their age, will be understood by even non-professional readers.

The speaker stated, however, that some evidence had been met with which indicated a possibility that exceptionally soft and ductile irons might behave like the other class of metals. It would be premature to state it positively, however.

### The Haddock Self-Feeding Nail Machine.

The Haddock nail machine shown in the accompanying illustration is a self-feeder, only requiring that the plates be placed in the feeding apparatus. The rest of the work is automatic. The blanks are cut with the heads lying alternately in opposite directions, an oscillatory



THE HADDOCK SELF-FEEDING NAIL MACHINE.

movement being given to the feed apparatus. This motion takes the place of turning the plate over by hand, and is effected by two eccentrics, one giving a small motion to the inner end of the feeding plate, and the other a greater motion to the outer end. This double motion necessitates the use of a wider knife than in the ordinary machine, but this is a great advantage, as the knife, alternately cutting broad and narrow pieces, wears much more evenly than the narrow knife of the ordinary machine, which always cuts the broad end (for heads) on one side, and the narrow end (for points) on the other. In consequence of this even wear, it is claimed that the Haddock machine is less frequently stopped for grinding. There being one moving and one bed knife, as in the ordinary machine, but two headers and two sets of dies, they thus do not heat so quickly—the dies on the right are cooling, while those on the left are forming the nail. Working alternately, and making a nail each revolution of the machine, the temper of the dies is less liable to be drawn, thus gaining in time and labor expended in grinding, as well as in a great saving of steel.

Regarding economy of work the company make the following statement: The 10 penny machine now in general use should average about 16 kegs a day. The Haddock machine actually does average 20 kegs in the same time with 12 inch plate. One boy can feed two 10 penny machines with this plate; three easily with 15 or 18 inch, and on cold plate machines—those making from 3 penny to 6 penny nails—one boy can feed four to five Haddock machines. The ordinary machine requires skilled feeders, and 18 inch plate cannot be used at all. In estimating the economy in labor of the Haddock machine, we assume the nailer (whose work will be substantially the same with either machine) shall continue to earn the same wages. The wages of feeders for Haddock's machines, however, are those of unskilled labor.

The Haddock machine costs about \$55 each more than the kind now in use; is simple in construction; not liable to get out of order; requires no additional power or care to run it, and is adapted to all sizes of nails. In sup-

port of these facts we need only mention that it has met the approval of the best nailers in the Pittsburgh iron district who have seen it.

The first Haddock machine has been constantly and successfully working for the last three years. Since that time, however, improvements have been made that were suggested by experience with it. A high a product as 28 kegs per day has and can be obtained on the 10 penny machines, by using 18 inch plate instead of 12 inch. While this is above the average, yet they are guaranteed to turn out 20 kegs on 12 inch plate and 22 kegs on 18 inch.

When worked to its full power, it is claimed, the Haddock machine can, in a factory having 75 machines, turn out 1575 kegs of nails per day, requiring only 18 nailers and 19 feeders. In other words, in a nail factory of 75 machines, the Haddock machine will turn out 525 kegs of nails more than the ordinary machine, and will dispense with the labor of 56 men.

The litigation in which this patent has been involved for several years, was terminated on the first of January, 1876, by the Aurora Iron and Nail Company purchasing every outstanding claim of the various contestants and having all the American and foreign patents involved transferred to themselves.

**An Old Iron Works.**—Among the old iron works to be met with in the Yorkshire district are those of Messrs. Thomas Andrews & Co., Wortley, near Sheffield. These works are supposed to have been established at the time of the Roman occupation, large quantities of scoria having been found in the adjacent woods. It is said that the road from Grenoside to Wortley, which was made in the time of the first Lord Wharfedale, owes its durability to the circumstance that its substratum consists chiefly of this half-fused iron ore. On the forge wall may still be seen a sculptured representation of a tilt hammer with initials and the date 1713 beside it, that being the date at which the works were enlarged and improved. A testimony to the antiquity of the works, and bearing date anterior to this, is the following inscription which is still legible on a gravestone in Wortley churchyard: "Here lies the body of Francis Askew, of Upper Forge, hammerman; died October 24, 1669." At the beginning of the present century the works were owned by Mr. James Cockshutt, at one time a partner of Crawshaw. Cockshutt laid down one of the first grooved rolling mills and puddled his iron into blooms, and was one of the pioneers of improvement in the manufacture of iron. The Wortley Iron Works were again extended in 1825, and in 1855 and 1868 were further enlarged, and, in fact, thoroughly remodelled by the present proprietors. Some of the first railway axles used at the commencement of the railway system were made at the Wortley Works, and this class of manufacture has been continued ever since. The works are now laid out with all the most modern appliances for turning out

railway axles and all the best classes of wrought scrap iron.

Peru contemplates an imitation in her silver mines of the Suro Tunnel, which for many years has been in process of construction for the drainage of the mines of the Comstock lode, in Nevada. The famous silver mines of Cerro de Paseo, in Peru, have, since their first discovery, yielded silver estimated at \$500,000,000 in value. This enormous sum was realized in spite of unfaithful working and of crude systems that did not produce anything like the amount the ore was capable of yielding. The projected tunnel by draining the mines, it is thought, will restore their value and enable the miners to reach the richest ores. The project is a plan of Mr. Henry Meigs, the famous American railway builder of Peru, and if it is pushed with the vigor characterizing his Peruvian railway construction, it is likely to be successful.

The *Engineering News* says: When steam cars are once successfully introduced upon street railways, we shall look for the adoption next of traction engines for handling the heavy loads, which are now conveyed from foundries and iron working shops by the aid of large teams of horses, taking up much space and seriously interfering with public convenience. These engines have been used in considerable numbers in some of the cities of England and Scotland, but we believe the only shape in which steam appears in the streets of our American cities, except as previously noted, is in driving the heavy road rollers, so effective in consolidating the roadway.

An alloy of one hundred parts of aluminum and five of silver can be worked like pure aluminum, but is harder and susceptible of a beautiful polish. An alloy of one hundred parts of silver and five of aluminum is nearly as hard as ordinary silver, but has the advantage over it of containing no metal of a poisonous nature, or which can effect a discoloration of the silver.

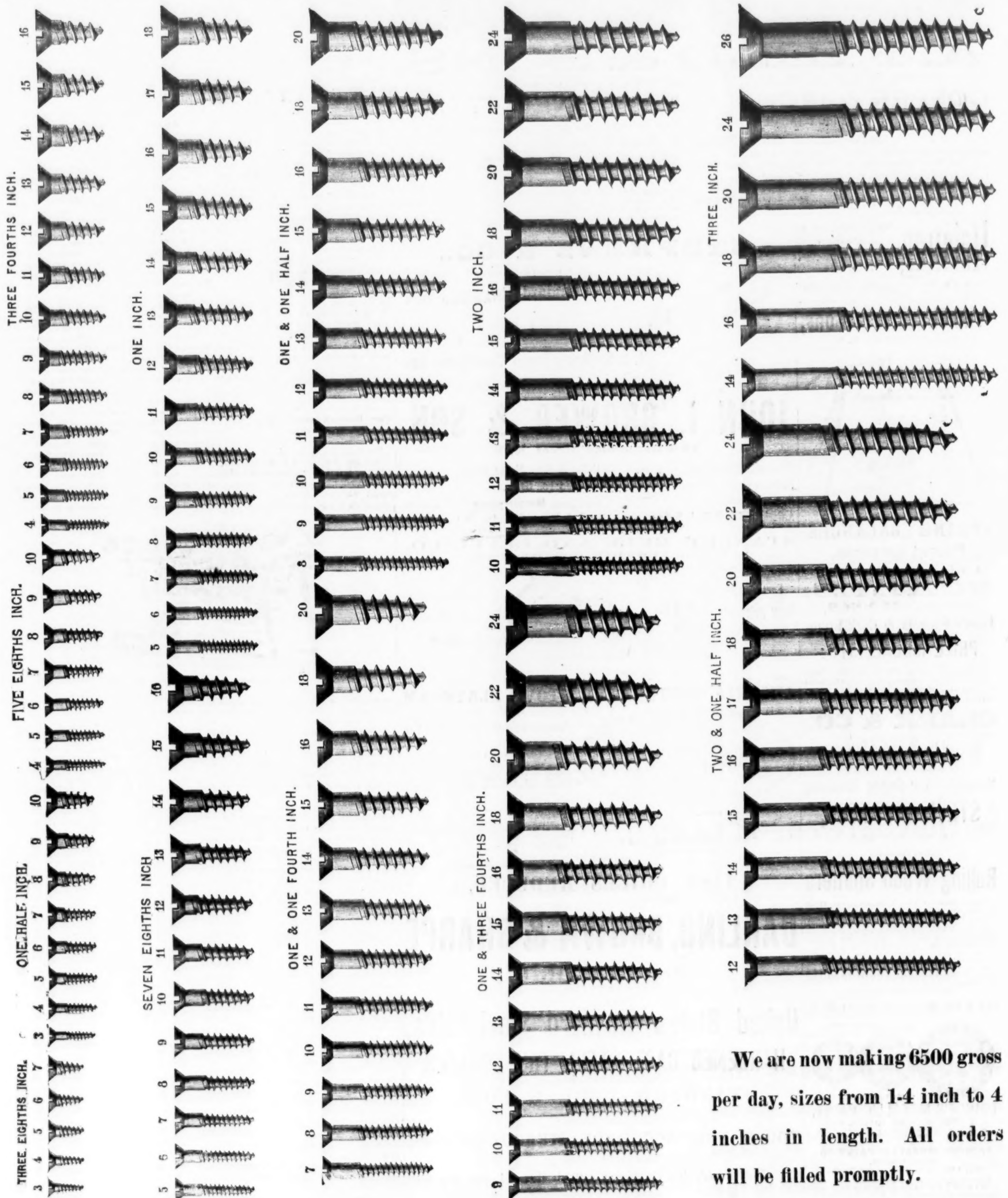
# RUSSELL & ERWIN MANUFACTURING COMPANY

## Manufacturers of HARDWARE.

FACTORIES, - - - NEW BRITAIN, CONNECTICUT, U. S. A.

MANUFACTURERS' AGENTS AND DEALERS IN GENERAL HARDWARE AT OUR

WAREHOUSES: NEW YORK, 45 & 47 Chambers St.; PHILADELPHIA, 425 Market St.; SOUTHERN DEPARTMENT, BALTIMORE, MD., WM. H. COLE, Agent, 17 S. Charles St.



We are now making 6500 gross per day, sizes from 1-4 inch to 4 inches in length. All orders will be filled promptly.

## Cutlery.

## FRIEDMANN &amp; LAUTERJUNG,

Manufacturers of PEN AND POCKET CUTLERY.

Solid Steel Scissors, Shears, Razors,  
Russia Leather Straps, Hones, &c.**"ELECTRIC RAZORS,"**And the celebrated **"ELECTRIC SHEARS."** Nickel Plated  
Bows.

Agents for the BENGALL RAZORS.

AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &amp;c.

91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

MERIDEN CUTLERY CO.  
Received the HIGHEST CENTENNIAL PRIZE.

MANUFACTURE ALL KINDS OF TABLE CUTLERY.

Exclusive Makers of the "PATENT IVORY" or Celluloid Knife, the most durable WHITE HANDLE known. The Oldest Manufacturers in America. Original Makers of the HARD RUBBER HANDLE. Always call for "Trade Mark" "MERIDEN CUTLERY CO." on the blade. Warranted and sold by all Dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.



## THE MILLER BROTHERS CUTLERY CO.,

Manufacturers of

## PATENT FINE PEN &amp; POCKET CUTLERY

WEST MERIDEN, CONN.

The only knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knife. We also make

## NICKEL &amp; SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory, and in New York by Messrs. J. Clark Wilson &amp; Co., No. 81 Beekman Street (who have a full stock of all patterns always on hand), and also by Messrs. G. B. Walbridge &amp; Co., No. 99 Chambers Street.

## NAUGATUCK CUTLERY CO.,

Manufacturers of FINE PEN &amp; POCKET CUTLERY.

FULLER BROS., Sole Agents, 89 Chambers and 71 Reade Sts., N. Y.

## HALL, ELTON &amp; CO.,

Electro Plated Ware, German Silver and Britannia Spoons.



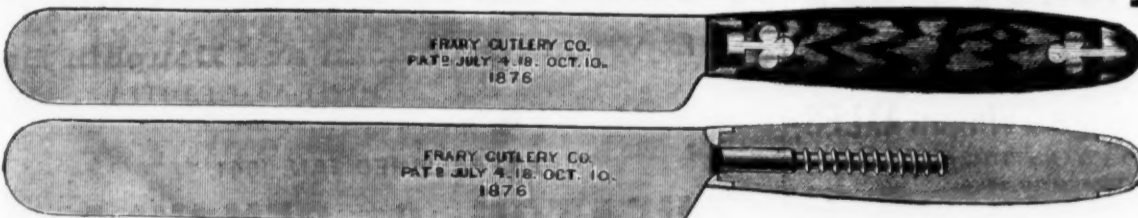
Factories, Wallingford, Conn.

Salesroom, 75 Chambers Street, New York.

## THE FRARY CUTLERY COMPANY,

FACTORY, Bridgeport, Conn. NEW YORK OFFICE &amp; WAREHOUSE, No. 82 Chambers St.

## Manufacturers of all kinds of Table Cutlery.



The above illustrations represent their New Patent Screw Tang Lock Fast Solid Handle Knife.

There is no question but that a solid handle knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day use. The cement will expand and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent screw tang. A wood screw is welded to the tang of the knife or fork, and screwed firmly and securely in the handle and locked there by the bolster, making a very strong and handsome knife, which we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butcher and Carvers, and furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly, and very respectfully invite the attention of the trade.

## OWEN &amp; CAMPBELL,

Manufacturers of

## PEN AND POCKET CUTLERY.

All blades forged from the best English Cast Steel, and Warranted. Each knife made in the most substantial and compact manner, all articles being of the best quality. All blades stamped Owen &amp; Campbell, Philadelphia. Orders filled from the Factory

10th &amp; Diamond Sts., Philadelphia.

## THE ROGERS CUTLERY CO.,



MANUFACTURERS OF

## Cutlery &amp; Silver Plated Goods.

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## Cutlery.

ESTABLISHED 1852.

## NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

## Table &amp; Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

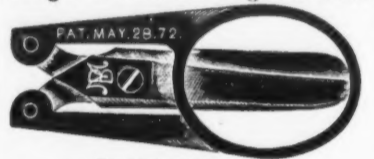
WALKILL RIVER WORKS,

Walden, Orange Co., New York.

THOS. J. BRADLEY, President.



## Young's Patent Folding Scissors.



Five times of the small size.

These Scissors are made of the very best steel, nickel plated, and so constructed that they can be readily folded and carried in the pocket without injury to the contents. A sample pair will be sent by mail, to the trade only, upon receipt of the retail price, namely: For small size, either blunt or pointed.....\$1.00 Large size, pointed or half pointed.....\$1.50 New York, Feb. 1st, 1876.

MARX BROS., Proprietors, 430 Broadway.

## AMERICAN

## PEN AND POCKET KNIVES,

MANUFACTURED BY



PEPPERELL, MASSACHUSETTS

My Blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society; also a medal and diploma from the Mass. Mechanics' Ass'n. Sept. 1876.

Established 1853.

## AMERICAN SHEAR CO.

Manufacturers of

## Pen and Pocket Cutlery,

Shears, Scissors and Pruning Shears,

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Salesroom, 298 Broadway, New York, with LANDERS, FRARY &amp; CLARK.

## Cutlery.

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"Limited."

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Celebrated I-XL Cutlery, Razors, &amp;c

AGENT FOR

WALTER SPENCER &amp; CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

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Granted 1777.

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Birmingham and Sheffield,

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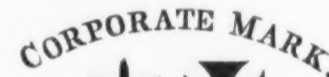
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## Joseph Rodgers &amp; Sons'

(LIMITED)

CELEBRATED CUTLERY,

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F. &amp; W. CLATWORTHY, Agents.

The demand for Joseph Rodgers &amp; Sons' productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam power.

To distinguish Articles of Joseph Rodgers &amp; Sons' Manufacture, please to see that they bear their Corporate Mark.

## VAN WART, SON &amp; CO.

Hardware Commission Merchants,

EXPORTERS AND IMPORTERS,

BIRMINGHAM, - ENGLAND.

Agents,

McCOY &amp; COMPANY,

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48 India Street, Boston.

F. W. TILTON,

17 Old Levee Street, New Orleans.

At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for

John Rimmer &amp; Son's Celebrated

Harness and other Needles.

W. Clark's Genuine Horse Clippers.

Seydel's "Ashantee" Pocket Hammer

McCOY &amp; COMPANY,

BORAX A SPECIALTY,

134 &amp; 136 Duane St., New York.

## ALFRED H. HILDICK,

12 Warren St., N. Y., Importer of

Birmingham Heavy Hardware, Chains,

Anvils, Vises, &amp;c.

Agency of HILL BROS. &amp; CO., WALSALL, ENGLAND.

GENERAL HARDWARE MERCHANTS,

And of

Ball's Pat. Solid Steel Sheep Shears.



These Shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use, either in the bow or at the junction of "back and blade." Samples can be seen at any address, or sample lots furnished. Depot for "THE CROWN" SOLID BOX VISES. A cheap and excellent Vise.

## WATERS' IMPROVED

## Pruning Implements

Are made of best steel on scientific principles.

Light, practical, durable, cheap.

Has no competitor for public favor, as thousands can testify.

See name in Agricultural Hall, Centennial, Philadelphia, Column T, No. 25.

Orders for full trade should be made early.

Manufactured only in this city.

Send for circular and price list.

E. S. Lee &amp; Co.,

ROCHESTER, N. Y.



Efficient, durable, and easily cleaned. Supplied to the trade only. Samples sent free to responsible houses. Agents wanted in every State. Send for illustrated circular and price list to

ROBERT CRANE, Jr., Columbia, Lancaster Co., Pa.

## The Joliet Iron and Steel Co.

The Joliet Republican says: At an adjourned meeting of the stockholders of the Joliet Iron and Steel Company, held in Chicago on the 9th of the present month, the committee previously appointed to receive proposals in regard to leasing the works of the company for a term of years, reported that they had found two competitors for a lease, Mr. A. B. Meeker and his associates, and the other steel rail mills of the country, or some of them, which were informally represented by Mr. Morrell at the annual meeting, which was adjourned to February 23d in order to enable those parties to prepare propositions.

On the 21st a proposition was received from Mr. Meeker in writing, and a verbal one the next day from Mr. Morrell, who stated that he acted on his own responsibility, not having consulted those whom he expected to associate with himself. These offers were not satisfactory, and the stockholders' meeting was adjourned until the 24th, on which day, at the request of Mr. Morrell's associates for more time, a further adjournment of thirteen days took place, and two of the committee went to Philadelphia and New York to meet the managers of the rail mills, but no formal meeting occurred, although several of those managers were interviewed informally.

No additional offer being received from these parties the committee presented a resolution recommending that the works be leased to a corporation to be formed by Mr. Meeker and his associates, which was voted upon by ballot, 12,853 votes being cast, and unanimously adopted. Messrs. A. J. Leith and Norman Williams were subsequently appointed as a committee to prepare and perfect the details of the lease.

The main provisions of Mr. Meeker's proposition are the formation of a lessee corporation under the laws of Illinois, with a cash capital of \$500,000, all to be subscribed by responsible parties before the 1st of May next, and \$200,000 of the amount to be paid in previous to the execution of the lease, which is to begin on the 1st of April, 1877, and expire December 31st, 1881. The remainder of the capital is to be paid in before July 1st, 1877, and no part withdrawn until the lease has terminated, and all dues under it have been paid. The lessee is to pay all taxes and insurance, keep the works in perfect repair, expend not less than \$15,000 a year in permanent improvements, and pay, as rent, \$103,000 per annum, of which \$100,000 will be applicable to the payment of mortgage interest, and \$3,000 to keeping up the corporate organization of the Joliet Iron and Steel Company.

The lessee is also to pay \$75,000 for the share allotted to the Joliet Iron and Steel Company in the "Bessemer Steel Company, Limited," and have the benefit of that share during the lease, but it is to stand in the name of the first mentioned company, and belong to it without any payment at the end of the lease, which is not assignable. In addition, the lessee is to pay, as further rent, a sum equal to one half the net profits which remain after paying the rent and deducting 10 per cent. on the cash capital of the lessee corporation, and take all the unmortgaged assets of the company, including \$30,000 of their second mortgage bonds, which have never been put on the market, and pay all liabilities of every kind, except the principal of the bonds. The lessee, moreover, is to protect the Joliet Iron and Steel Company against their bonds which are already due, as well as those which will become due during the lease, until 60 days after the expiration of said lease, with the right to convert first mortgage bonds into seconds, dollar for dollar, according to the terms of the second mortgage.

The foregoing is substantially the terms of the lease and other matters pertaining thereto, and it is unnecessary to repeat the assertion that by the acceptance of Meeker & Co's proposition, the future prosperity of our city and the successful operation of the mills are assured. The contest for the possession of them has been going on for some time between Eastern and Western capitalists, and the result is a triumph for the latter. Had they fallen into the hands of the former they would have been closed for an indefinite period, if not permanently. The credit of this final excellent and satisfactory arrangement is mainly due to the untiring exertions of the Hon. W. S. Brooks, of this city, and such staunch friends of Western enterprise as A. B. Meeker and F. E. Hunkley, of Chicago; John G. Scott and A. J. Leith, of St. Louis; J. I. Case, of Racine, and a few other energetic spirits. The old company ran the mills under many disadvantages, not the least of which were the general depression in business and the competition of long-established and wealthy Eastern corporations. They commenced to make steel rails for \$34 per ton, and got only \$50 per ton now, although the former was considered a low price. They kept the mills in operation mainly on the credit of persons connected with the management, and during the past thirty months have paid out at their office here an average of \$50,000 per month, paying for labor alone last year about \$344,000. The total products of the works in these two and a half years amounted to over \$5,000,000. The new organization, beside its cash capital, owns extensive coal and other mines, coke furnaces, and is a strong one in every respect.

Mr. H. S. Eaton, president of the British Meteorological Society, estimates that the heat developed from the present annual consumption of 5,000,000 tons of coal on the metropolitan area of 118 square miles, and from all other artificial sources, would suffice to raise the temperature of a stratum of air 100 feet in depth resting on that area 2.5° every hour. The climate of London has been greatly modified during the present century by its great growth in population and corresponding consumption of fuel.

**Philadelphia "STAR" Bolt Works.**  
 NORWAY IRON FANCY HEAD BOLTS.  
 Carriage & Tire Bolts. **Star Axle Clips, &c.**  
 TOWNSEND, WILSON & HUBBARD, 2301 Cherry St., Philadelphia, Pa.

**COLEMAN**  
**EAGLE BOLT WORKS.**  
 (ESTABLISHED 1845.)

The Original and Only Establishment Manufacturing the  
**Genuine Coleman Eagle Bolt.**

Made of Best Quality  
 SQUARE NORWAY IRON.  
**WELSH & LEA,**  
 Successors to M. J. COLEMAN.  
 WORKS, Columbia Avenue, Hancock and Mascher Sts.,  
 OFFICE, 145 Columbia Avenue (Late 2030 Arch St.),  
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**HOOPES & TOWNSEND,**  
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**"Keystone" Boiler Rivets,**  
**BRIDGE & SHIP RIVETS.**

**WORCESTER MACHINE SCREW CO.,**  
 WORCESTER, MASS. Established 1867.

MANUFACTURERS OF  
**Standard Machine Screws.**  
 ALSO  
 Square, Round, and Hexagon Head Set & Cap  
 Screws, in Iron, Steel and Brass.  
 We have adopted the American Screw Co.'s price list for Machine  
 Screws. Attention is called to our reduced price list for Set and Cap  
 Screws, adopted January 1, 1877. A full line of all goods kept in stock  
 at both the factory and store of our agents.  
**H. S. MANNING & CO., No. 111 Liberty St., N. Y.**  
 Send for Lists and Discounts.

**TURNED MACHINE SCREWS.**  
 One-sixteenth to five-eighths diameter.  
 Heads and points to sample.  
**IRON, STEEL and BRASS.**  
**Lyon & Fellows Mfg. Co.,**  
 Cor. 1st and North 3d Streets, Williamsburgh, N. Y.

**A Fact. Jobbers & Dealers in**  
**CARRIAGE AXLES**  
 Buy Goods of the  
**Best WARRANTED material**  
 FOR THE LEAST MONEY OF THE  
**CLEVELAND AXLE MFG. CO.**  
 CLEVELAND, OHIO.

Send for Prices and Sample Lot.  
**W. C. BARKER & CO.,**  
**Iron, Steel, Nails,**  
 HEAVY HARDWARE, WAGON AND CARRIAGE MATERIAL, DRILLS,  
 ANVILS, BELLOWS, VISES, CHAINS, &c.  
 CHICAGO ILLS.

**AMERICAN**  
**BOLT & NUT WORKS,**  
 Cincinnati.

**L. M. DAYTON,**  
 CINCINNATI, O.

**MILL,**  
 Anchor Iron & Steel Works,  
 Newport, Ky.

Bar Iron, Carriage Bolts, Plow Bolts,  
 Sheet Iron, Tire Bolts, Hot Pressed Nuts,  
 Horse Shoe Iron, Machine Bolts, Washers.  
**BRIDGE AND RAILROAD WORK A SPECIALTY.**

**CLARK BROTHERS & CO.,**

SOLE MANUFACTURERS OF

**Clark's Patent Concave Carriage Bolt.**  
 Best Bolt manufactured for all kinds of Agricultural Machinery. Will not split the wood, and cannot turn in its place.  
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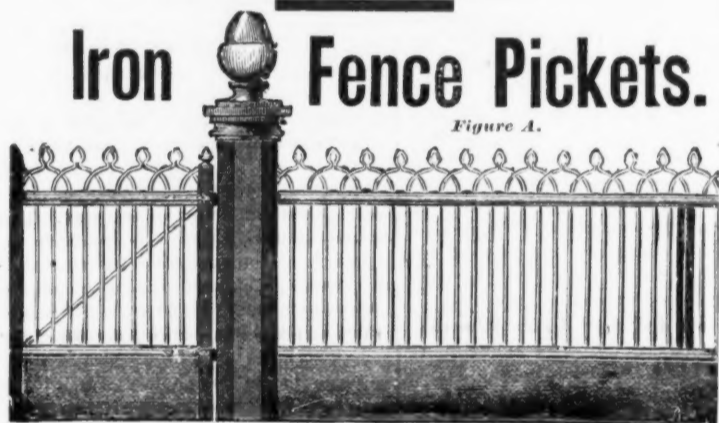
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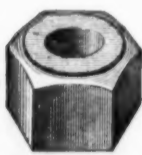
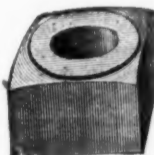
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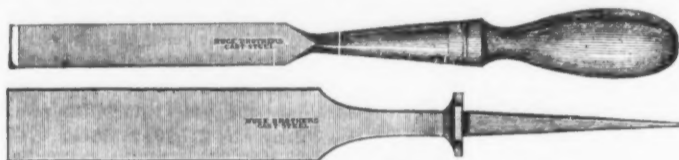
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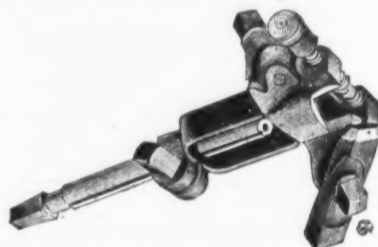


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JAMES C. BAYLES, Editor.  
JOHN S. KING, Business Manager.

## RATES OF SUBSCRIPTION, INCLUDING POSTAGE.

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JOS. D. WEEKS, Manager and Associate Editor.

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## BRITISH AGENCY.

The publishers of *The Iron Age*, 44a Cannon Street, London, England, will receive orders for subscriptions and advertisements on our regular terms.

## AUSTRALIAN AGENCY.

The American Hardware Company are our agents for Australia. They will exhibit files of *The Iron Age* in the American Building of the International Exhibition, at Sydney, N. S. W., where subscriptions will be received. After the close of the Exhibition, the files may be examined at, and orders for subscription directed to, their offices in Melbourne. Sample copies will be mailed by them, free of charge, to any firm engaged in the trade we represent in Australia, Tasmania and New Zealand.

City subscribers will confer a favor upon the Publisher by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in any way or upon stairs, and to our desire and intention to enforce this rule in every instance.

## REMOVAL.

The office of *THE IRON AGE* will be removed May 1st, 1877, to No. 83 Reade street, southeast corner of Church street.

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## Our Export to Australasia.

During the past eighteen months numerous articles have been published in the English and American newspapers about the growing importance of our export trade to Australia, Tasmania and New Zealand. In our own columns we have followed up this interesting subject with some care, and with the statistics of the past seven fiscal years before us, we trust it will be to some useful purpose if we examine the progress made in that direction, especially in those departments of trade which more particularly concern our readers.

The general course of our Australasian trade since 1869, is shown in the following tables:

### Export of Domestic Products to Australasia.

	In American Vessels.	In Foreign Vessels.	Total.
1870.....	\$2,272,723	\$1,141,250	\$3,413,973
1871.....	1,851,354	993,192	2,844,546
1872.....	1,506,411	1,023,231	2,529,642
1873.....	2,894,246	1,235,735	4,130,000
1874.....	2,939,476	1,329,700	4,269,176
1875.....	2,748,798	1,136,098	3,884,896
Average.....	16,458,693	7,323,915	23,782,608

From this it will be seen that 70 per cent. of the goods were carried in American bottoms, which is more than we can say of our exports to most other countries. Our average annual export to Australia during this period was \$3,397,515, 1876 exceeding the average by \$487,351. The following are some of the principal items:

### Agricultural Implements.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$104,064	57,330	27,691	63,565	\$104,064	57,330	57,772
1871.....	57,330	27,691	63,565	116,840	57,330	27,691	57,772
1872.....	27,691	63,565	116,840	57,330	27,691	63,565	57,772
1873.....	63,565	116,840	57,330	27,691	63,565	116,840	57,772
1874.....	116,840	57,330	27,691	63,565	116,840	57,330	57,772
1875.....	57,330	27,691	63,565	116,840	57,330	27,691	57,772
Average.....	57,772	57,772	57,772	57,772	57,772	57,772	57,772

This item, we feel convinced, is susceptible of a much greater expansion.

### Carriages and Materials.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$140,314	29,882	70,064	85,856	\$140,314	29,882	85,856
1871.....	29,882	70,064	85,856	116,840	29,882	70,064	85,856
1872.....	70,064	85,856	116,840	57,330	70,064	85,856	85,856
1873.....	85,856	116,840	57,330	27,691	85,856	116,840	85,856
1874.....	116,840	57,330	27,691	63,565	116,840	57,330	85,856
1875.....	57,330	27,691	63,565	116,840	57,330	27,691	85,856
Average.....	85,856	85,856	85,856	85,856	85,856	85,856	85,856

### Clocks and Materials.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$54,630	46,124	56,798	51,149	\$54,630	46,124	51,149
1871.....	46,124	56,798	51,149	116,840	46,124	56,798	51,149
1872.....	56,798	51,149	116,840	57,330	56,798	51,149	51,149
1873.....	51,149	116,840	57,330	27,691	51,149	116,840	51,149
1874.....	116,840	57,330	27,691	63,565	116,840	57,330	51,149
1875.....	57,330	27,691	63,565	116,840	57,330	27,691	51,149
Average.....	51,149	51,149	51,149	51,149	51,149	51,149	51,149

### Glass and Glassware.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$85,438	42,134	23,812	18,619	\$85,438	42,134	23,812
1871.....	42,134	23,812	18,619	57,330	42,134	23,812	23,812
1872.....	23,812	18,619	57,330	116,840	23,812	18,619	23,812
1873.....	18,619	57,330	116,840	57,330	18,619	57,330	23,812
1874.....	57,330	116,840	57,330	27,691	57,330	116,840	23,812
1875.....	116,840	57,330	27,691	63,565	116,840	57,330	23,812
Average.....	23,812	23,812	23,812	23,812	23,812	23,812	23,812

Under this head, it is shown, we have been losing ground, which is a little surprising in view of our rapid general progress in glass manufacture.

### Rubber and Gutta Percha Goods.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$15,005	13,781	61,879	21,061	\$15,005	13,781	21,061
1871.....	13,781	61,879	21,061	57,330	13,781	61,879	21,061
1872.....	61,879	21,061	57,330	116,840	61,879	21,061	21,061
1873.....	21,061	57,330	116,840	57,330	21,061	57,330	21,061
1874.....	57,330	116,840	57,330	27,691	57,330	116,840	21,061
1875.....	116,840	57,330	27,691	63,565	116,840	57,330	21,061
Average.....	21,061	21,061	21,061	21,061	21,061	21,061	21,061

Our rubber goods in every conceivable shape have gained such universal approval abroad that we ought to be able to accomplish more in this line, especially in mining outfits.

### Machinery.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$20,529	11,029	8,505	19,657	\$20,529	11,029	11,029
1871.....	11,029	8,505	19,657	57,330	11,029	8,505	11,029
1872.....	8,505	19,657	57,330	116,840	8,505	19,657	11,029
1873.....	19,657	57,330	116,840	57,330	19,657	57,330	11,029
1874.....	57,330	116,840	57,330	27,691	57,330	116,840	11,029
1875.....	116,840	57,330	27,691	63,565	116,840	57,330	11,029
Average.....	11,029	11,029	11,029	11,029	11,029	11,029	11,029

This shows notable progress, but considering our business in machinery with other countries, we ought to do ten times as much with Australia.

### Nails and Spikes.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$17,330	7,468	10,345	41,064	\$17,330	7,468	10,345
1871.....	7,468	10,345	41,064	116,840	7,468	10,345	10,345
1872.....	10,345	41,064	116,840	57,330	10,345	41,064	10,345
1873.....	41,064	116,840	57,330	27,691	41,064	116,840	10,345
1874.....	116,840	57,330	27,691	63,565	116,840	57,330	10,345
1875.....	57,330	27,691	63,565	116,840	57,330	27,691	10,345
Average.....	10,345	10,345	10,345	10,345	10,345	10,345	10,345

Our export, it will be seen, has fluctuated a good deal. In future we shall probably send them increased quantities.

### Cutlery and Edge Tools.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$89,959	78,068	79,348	144,644	\$89,959	78,068	79,348
1871.....	78,068	79,348	144,644	57,330	78,068	79,348	79,348
1872.....	79,348	144,644	57,330	27,691	79,348	144,644	79,348
1873.....	144,644	57,330	27,691	63,565	144,644	57,330	79,348
1874.....	57,330	27,691	63,565	116,840	57,330	27,691	79,348
1875.....	27,691	63,565	116,840	57,330	27,691	63,565	79,348
Average.....	79,348	79,348	79,348	79,348	79,348	79,348	79,348

### Other Manufactures of Iron and Steel.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$305,853	176,760	327,191	479,784	\$305,853	176,760	327,191
1871.....	176,760	327,191	479,784	116,840	176,760	327,191	327,191
1872.....	327,191	479,784	116,840	57,330	327,191	479,784	327,191
1873.....	479,784	116,840	57,330	27,691	479,784	116,840	327,191
1874.....	116,840	57,330	27,691	63,565	116,840	57,330	327,191
1875.....	57,330	27,691	63,565	116,840	57,330	27,691	327,191
Average.....	327,191	327,191	327,191	327,191	327,191	327,191	327,191

It appears from the preceding three items that we have been shipping to those parts on an average \$486,499 annually. There is every prospect that we shall exceed this figure in a notable degree from this time forward. The exhibition at Sydney will no doubt do good service to the hardware manufacturers who sent exhibits.

### Quicksilver.

	1870.	1871.	1872.	1873.	1874.	1875.	Average.
1870.....	\$9,000	18,000	50,356	23,386	\$9,000	18,000	23,386
1871.....	18,000	50,356	23,386	57,330	18,000	50,356	23,386
1872.....	50,356	23,386	57,330	116,840	50,356	23,386	23,386
1873.....	23,386	57,330	116,840	57,330	23,386	57,330	23,386
1874.....	57,330	116,840	57,330	27,691	57,330	116,840	23,386
1875.....	116,840	57,330	27,691	63,565	116,840	57,330	23,386
Average.....	23,386	23,386	23,386	23,386	23,386	23,386	23,386

The proximity of our quicksilver mines to Australia insures a large sale in the near future, especially if present low prices continue to prevail.

### Scales.

872.....	327,791	1876.....	427,214
873. ..	479,784	Average ..	355,022

It appears from the preceding three

### The Iron Age and the Institute of Mining Engineers.

The following letter from Mr. Joseph D. Weeks, relating to a matter already considered in these columns, appeared in the *Engineering and Mining Journal* of March 24th:

To the Editor—Sir: I was somewhat surprised, upon having my attention called to your article in the last issue of the *Engineering and Mining Journal*, to find that, in replying to an editorial in *The Iron Age* of the 8th inst., you had made me the object of a personal attack. The basis of this attack is the publication in *The Iron Age* of Mr. Bell's paper, read at the June meeting of the Institute, and the circumstances connected therewith. As these circumstances have been in a number of instances grossly, though I do not charge willfully, misrepresented, I wish to say that for the opportunity of publishing that paper or any part of it, or for the possession of the manuscript, or for the privilege of copying it, I am under no obligation to any officer of the Institute, nor was I, as representative of *The Iron Age*, responsible to them or any officer for the use I made of the manuscript or the copy made from it. The manuscript did not come into my possession from or through any officer, or by their courtesy or permission, but from Mr. Bell, who gave it to me on the 15th inst., to whom I returned it, and to whom alone I am responsible. The Secretary, after consultation with yourself, refused me permission to use it as I had previous papers, and before it had come into his possession I used it and returned it to Mr. Bell, not to the Secretary. Had I obtained the paper from the Secretary, or through him or by his consent, I would have been under some responsibility to him; but as I did not, there could have been no "clear understanding" violated; in fact, I could have had no understanding as to what use I should make of this particular paper.

Regarding your intimation that my action in the matter of the Bell paper was the result of the decision of the council refusing the offer of *The Iron Age* to print the proceedings of the Institute, I have only to say that this decision was not known to me until long after the Bell paper was published, and my recollection is that it was after such publication that the Council took this action.

A large part of the report of the Washington and Philadelphia meetings was made from manuscript notes, the report of nearly all the discussions having been made in this way, and a large part of the papers read, and not from the papers furnished me by the Secretary, though in making this statement I have no wish to deny the many obligations I am under to Prof. Brown.

Regarding your charge of obtaining copies of papers "unreputably," I have only to say this is not so. Every paper we have published in full we have received directly from the author, with the full knowledge that it was to be published by us, at our convenience. As the parties furnishing us with these papers were members of the Institute, if there was anything "unreputable," they were each "particeps criminis." How they relish such a charge is for them to determine.

Trusting to your courtesy to give this a place in your columns, I am, respectfully,

JOSEPH D. WEEKS, Associate Editor.

PITTSBURGH, March 21.

The only consideration which this communication receives at the hands of Mr. Raymond is the following brief paragraph:

We give Mr. Weeks the full benefit of his statement of the case, and decline to discuss with him what constitutes an "understanding," or a "unreputable" evasion of it. Our ideas on these points are irreconcilably opposed to his.

This is certainly a very easy way of disposing of the subject, but we are compelled to say that it is at least inconclusive. No clear statement of the charges against Mr. Weeks has ever been given to the members of the Institute, nor to us. The insinuations which have been made against him, based upon his action at the same meeting in Philadelphia in the matter of Mr. Bell's paper, he has met frankly, fairly and fully. His statement is certainly entitled to respectful consideration and should not be set aside with a wave of the hand. It is barely possible that, as both the gentlemen in question are honorable men, their ideas on the subject are not so "irreconcilably opposed" as Mr. Raymond is pleased to assume.

The letter of Mr. Weeks above printed, together with our account of the whole transaction as we understand it, puts the matter in such shape that we fail to see how any gentleman with a due regard for justice and honor can make any further uncomplimentary allusion to Mr. Weeks' actions as our representative in the meetings of the Institute, unless he is willing to make a specific and circumstantial charge against him, which can be as specifically and circumstantially met, if unfounded. When the facts have been discussed it will be quite soon enough for Mr. Raymond to assume that Mr. Weeks does not comprehend the nature of an "understanding," or know quite as well as himself what is considered an obligation among gentlemen.

And now a few words about another matter. The brief article from which the above extract is made, concludes with the following allusion to our article of the 15th instant:

*The Iron Age* of this week very handsomely retracts a portion of its erroneous statements concerning the management of the Institute. We have no doubt it will be convinced in time of the courtesy and fair play which not only the Institute but the *Engineering and Mining Journal* is ready to extend to it. Meanwhile it is due to all parties to point out that with the charges which *The Iron Age* so promptly and fully retracts, all the inferences which it built upon them fall to the ground, and the way is clear for a fair discussion of the best way to publish the proceedings of such a society as the Institute. We beg *The Iron Age*, if it is still dissatisfied with the present system, to suggest a complete one which it deems better.

We, in turn, beg to remind the gentleman that we retracted all the statements made in our first article which we have had reason to consider erroneous. The

rest we have had no intention of withdrawing, and we see no reason why we should. Neither "courtesy" nor "fair play" requires us to retract statements of facts entirely within our own knowledge, and susceptible of abundant proof. Our views respecting the policy of the Institute in the publication of its papers and proceedings—which we may say have undergone no change—will be very fully presented at our convenience.

### Baking Japans.

We are frequently in receipt of inquiries from our subscribers and others on the subject of baking Japans—what to use; how to use them; how to prepare for use, &c., and we offer in the present article some information on these points. If it does not cover the whole ground it will, doubtless, be of material value to those interested:

A baking Japan should, in the first instance, be adapted to the degree of heat at which it is to be baked. For instance, an article exactly suitable for tinware and goods of that description, which require a temperature of, say, 120° to properly bake, would be entirely inappropriate for grates and fenders and other iron goods which are to be exposed to rough usage, or, perhaps, to a considerable degree of heat while in use. The Japan required for this latter variety of work needs an oven at about 500°, in which it will harden, if properly prepared, in twenty minutes, while at the temperature requisite for the other class of goods, it will not harden and become durable though baked for days. On the other hand, the stock exactly suitable for the lighter goods would be burned and irretrievably injured at this high temperature. Consumers will learn from this hint, if they have not already learned from experience, that it is of the utmost importance for them to let the varnish manufacturer or dealer know exactly what uses his Japans are required for, in order to be supplied with the kind adapted to the particular work in hand. Much vexation would be saved if japanners would follow the rule of procuring different and suitable brands of goods for their different kinds of work, and much vexation will be caused if they neglect so to do, and persist in the common habit of coating cash and lunch boxes with the same coating which they apply to piano plates and sewing machines.

Another cause of bad results and consequent bad humor in the Japan room, is the tendency on the part of employees, and even on the part of the boss himself, no matter how intelligent, to tamper with the composition of the best adapted stock by thinning, thus rendering it entirely unfit for the use intended or, indeed, for any other. Let us illustrate. A good Japan for cast iron work, we will say, is composed of certain ingredients in certain proportions, these ingredients always bearing the same relation to each other, and each being as necessary as the other to the perfect mass. Among these ingredients glutinous matters form no inconsiderable part. Now, when a Japan exactly adapted to its use in this way is applied to a piece of iron and afterward submitted to an appropriate degree of heat, to the mind of the uneducated artisan it appears to simply dry and form a glossy and enduring coating on the surface of the metal. Really, however, the process is a much more complicated one. In the first place, the heat applied to the metal opens the pores of that metal, at the same time rarifying and expelling the air contained in those pores. Then the coating applied, rendered more than ordinarily fluid by the same heat, sinks into and fills up the apertures thus opened and rendered vacant, and the consequence is that the Japan not only sticks to the surface of the iron, as it is said to do in common parlance, but it is absolutely rooted thereto by myriads of invisible but tenacious roots which extend down into its very body. Next comes the cooling process, in which the pores return to their former size, gripping these roots more and more firmly as they contract, until the thin film on its exterior is held to the metal almost as rigidly as though it were part and parcel thereof.

Viewed in this light it will not be difficult for the veriest apprentice to comprehend what the result will be where the character of the Japan is altered by the unguarded addition of turpentine, or even oil, until, instead of the glutinous substance which it ought to be, it has been converted to a fluid almost of the consistence of turpentine itself. In this case the process of delving into the pores will be accomplished as before, and, in fact, with even greater facility, and to a greater depth, but the roots sent out will lack the consistence necessary, and will subserve about as useful a purpose in holding the coating to the substance coated as would cables of sand in mooring a ship.

The question at once arises, How should our Japans be liquified when of too firm a consistence? Precluded from the use of turpentine, our standard resort, and also oil, what shall we use for thinning? We answer, use baking copal varnish, which has properties which not only render it the best thinning at present known, but which has also those other properties which fit it to properly anchor the varnish to the metal.

Having prepared the Japan for use, the next necessity—also a very important one—is to have the surface of the metal in a proper state; particularly to have it cleansed from all substances which will prevent the coating from taking hold, such as animal oils, coal oils or other extraneous matters incompatible with Japan.

In regard to the number of coats necessary to the production of good work, a great deal depends upon the nature of the metal to be covered. Lead, and some compositions, for example, require a priming of lampblack and oil, while others can be effectively manipulated without this extra labor by one application and one heat. Where more than one application of Japan is requisite, we offer the following suggestions: Let the first be thinner than those that succeed it, in order that it may properly sink in and clinch and form a bed for the others. Let it be baked in a slightly higher temperature than after applications, as there should be no material softening of this coat when once fixed. This will also avoid the expulsion, on a second baking, of any vapors from it through the others, thereby preventing bubbling, blistering, cracking and porosity of the outer layer. Above all see that it is baked done. There was a time when it was customary, considered absolutely necessary, in fact, to forestall all Japans with a priming of the nature of that above mentioned, but happily the developments incident to experience and progress, have enabled varnish manufacturers to so improve upon ancient modes of manufacture that they are enabled now to furnish the tradesman with a stock which will produce the desired effect, except upon the particular substances alluded to, without the necessity of this double or treble outlay of time.

### THE MOLDERS' STRIKE.

#### Murder of a Non-Union Molder in Albany.

Another dastardly outrage was perpetrated Saturday night in the Third Precinct. On the 18th inst. William Charette, a non-union molder, was shot in the back, as he was leaving the boarding house, No. 826 Broadway. The assassin is still at large. Encouraged, no doubt, by the escape of the villain, others of the desperate gang to which he belongs have tried their hand at the hellish work.

Saturday evening, John Cleary, aged 40 years, who keeps a boarding house at No. 850 Broadway, went to the switch shanty of the Rensselaer and Saratoga Railroad, located between North Lansing and Colonic streets, and asked the switchman what time the train left for Montreal, as some non-union molders, who boarded at his house, wished to send some letters to Canada. The switchman took down his time card and gave Cleary the desired information, and then took his lantern and started down the track. Cleary turned and went toward Lansing street. As he neared the corner he heard a step behind him, and turned his head to see who it was. At that moment he felt a sharp, stinging sensation in his back and heard the report of a pistol. He caught a good glimpse of the assassin, who ran up the track and made good his escape. The wounded man walked up Lansing street to Broadway, where he met a citizen. He felt a sudden faintness, and exclaimed to the man, "My God! I am shot!" The citizen conducted him to the Third Precinct Station House, and Dr. Ball was summoned. The doctor saw at once that Cleary was seriously wounded, and ordered him conveyed to St. Peter's Hospital. This was done by the police of the precinct.

Upon arriving at the hospital, Cleary was suffering from a chill, and was almost pulseless. A careful examination was made, and it was ascertained that the ball had entered the back just below the ribs, and lodged in the abdominal cavity. Drs. Ward, Mosher, Balch and Lyons attended the wounded man and remained with him until three o'clock the following morning. Dr. Ward probed for the ball, but has thus far failed to secure it.

Cleary is a quiet, inoffensive man, and has been employed at Rathbone & Co.'s Foundry as a scratcher. He has never taken any part in the molders' difficulties. Cleary has a wife and four children, and several of the non-union molders board at his house on Broadway. When he was shot he was only about ten feet from the assassin, and thinks he can identify the villain. At last accounts the wounded man was quite comfortable, but the result of the wound cannot be determined. The surgeons have hopes of his recovery, but fear that inflammation may set in.

When the affair occurred Capt. Cavanaugh was on Arbor Hill. He was speedily informed of the affair and hastened to the station house to make arrangements for the capture of the assassin. A number of policemen were sent out in citizens' dress, and a thorough search was made. Captain Cavanaugh arrested one Barney Jordan, who was taken before Cleary, who at first said that he was the man who fired the shot. Jordan exhibited considerable trepidation and declared that he was not the man.

After looking at Jordan carefully, Cleary finally came to the conclusion that he was not the man. Up to three o'clock seven men answering the description given by the wounded man were arrested, but neither was identified.

These outrages are becoming alarmingly frequent. It was only a couple of weeks ago that a non-union molder named Dash was assaulted with a slungshot, within a block of Perry & Co.'s lower foundry, in broad daylight, and seven severe cuts inflicted on his head. Active measures must be taken to bring these scoundrels to justice. The police should and undoubtedly will make every effort to capture the dastardly villains. At present no life is safe. No better argument can be offered for the passage of the bill now before the Legislature, relative to concealed weapons, than a recital of the events of the past two or three weeks.

#### ARREST OF THE ASSASSIN.

From information received by the police, they were led to suspect that the assassin was a union molder named James Kelly. About half-past 11 o'clock Sunday night Captains Cavanaugh and Davidson and Officer Mulligan went to Kelly's house, No. 193 Orange street, and arrested Kelly, who was in bed. The prisoner was taken to St. Peter's Hospital, where Cleary positively identified him as the man who shot him. Kelly was then locked up in the Third Precinct Station House. Kelly is 26 years old and has a wife and one child. Sergeant Campton and Officer Mulligan searched Kelly's house for the pistol, but did not succeed in finding it.

#### REWARD.

Rathbone, Sard & Co. offer a reward of \$300 for the arrest and conviction of the person who shot William Charette on March 18th, and the same amount for the person who shot John Cleary on Saturday evening last.

#### PUBLIC OPINION.

Commenting on this outrage, the *Albany Morning Express* says:

"An innocent man was shot on Saturday night by a person apparently in practical sympathy with the Molders' Union. A week ago the knife was cruelly used in the same interest. Within the fortnight a peaceable German was brutally beaten with a murderous slungshot, his offense being that he worked without the sanction of a law-defying organization. An incendiary set fire to a non-union shop, and a reign of terror exists among those who have dared to protest against this autocratic union. In a word, we have modified Mollie Maguires among us, and, unless a sudden stop is put to the deeds of violence lately occurring, the modification will not be material. This condition of affairs is shameful. It is striking a blow at the fundamental principles of law and order, and is growing to a pitch which will require the strong arm of the State to suppress. The Molders' Union, or any organization which would connive at the cowardly work of the present month, is a detriment to the interests of the workman, and should be crushed by the force of law and public opinion. It may be that those not connected with the Molders' Union are guilty of the violence of the present month. We hope so; but appearances are not that way. We have called upon the Union to denounce publicly the lawless acts of its sympathizers, but our appeal has not been heeded.

"What is the result of this repeated violence? It means the retrogression of prosperity in this old Dutch city of ours. It means that the million dollars annually paid to workmen by the stove makers will be taken elsewhere. It means the loss of one of Albany's greatest interests, and the enforced poverty of our laboring men. That is what it means. It is not a war of capital against labor; but rather a bitter warfare, terrible in its results, waged by a few wild headed men against inoffending citizens, and tacitly supported by a powerful organization. There is no need of mining matters in a question of this kind. Already has the result of those repeated outrages begun to show itself. One of our leading firms has just concluded to give up its works, and has entered into a contract for its labor, at or near Sing Sing. Thus active capital is driven away, and a firm which paid to the molders last year a quarter of a million dollars, will hereafter take its money and business elsewhere. This is but the precursor of other removals just so serious to our commercial prosperity if violence is to continue.

"It is probable that the Governor will take the matter in hand, and offer a reward for the apprehension of the assassin of Saturday night; and of all others who, with what may be termed remarkable impunity, have violated law and order. In this he will be sustained by a community of which intelligent workmen, opposed to the recent carnival of uncalled for crime, form a generous part."

#### THE RESULT—PRISON LABOR IN STOVE MANUFACTURE.

The well known firm of Perry & Co., stove manufacturers of Albany, desiring to extend and enlarge their business, have entered into a contract with the agent and warden at Sing Sing, for the labor of convicts incarcerated in the state prison at that place. The contract is for a term of five years; but the continuance and magnitude of the business will depend upon the success of the experiment, for such it is alike on the part of Perry & Co. and of the Superintendent. They will probably employ 150 men on the start, increasing the number as circumstances may warrant. Work will be continued in Albany throughout the season.

The buildings to be occupied at Sing Sing are those lately used in the manufacture of cabinet ware, with the addition of an ordinary one-story wooden building to be erected. There is now a three-story building 230 feet long, another of one-story 80 feet long, with small buildings adjacent. Preparations for work have already commenced, and manufacture will begin within a month.

There are about 1450 men now confined at Sing Sing, more than one-half of whom are idle. Under former systems idle men have had free run of the yards, lying around on the grass and drinking poor whisky with great freedom. Now the convicts are locked in their cells when not at work. There is every reason to believe that the convicts will consider it a great blessing to be employed. Some of the men confined there are now occupied in the manufacture of lime for the State. It is doubtful if the State derives sufficient from its sale to render this manufacture one of sound policy. A foundry has also been in operation at Sing Sing for many years.

It is well known that there is a seemingly irreconcilable conflict between the stove manufacturers and molders. This conflict, it is claimed, relates not so much to wages as to the control of the business. The molders limit the number of apprentices to one for each eight men. These apprentices must be indentured. As the manufacturers do not wish to take this responsibility, the rule is regarded as substantially prohibiting apprentices. The rules allow no molder to work who is not a member of the Union. The Union claims the right to regulate the wages at any time. If after the contracts have been made for the season, the Union sees fit to increase the wages, this must be acceded to by the employers. They must keep their contracts, even though an unexpected advance in wages should make them all profitless. Under the old, or what is called the free system of work, it is said that many men gladly went to work at four o'clock in the morning, during the summer season, in order to escape the heat of midday. Now, it is a rule of the Union that no man shall begin work before seven o'clock. Work in the foundries is done by the piece. If a piece of work is given to a molder and there is a disagreement as to the price due under the scale, the decision of the first man to whom it is offered, sustained by the Shop Committee, binds all the rest, unless the employers, upon an appeal to the Union, succeed in getting it reversed. If, for instance, the manager fixes the price at ten cents, and the molder at twelve, no other molder will be allowed to take it for less than the latter price, except upon the authority of the Union, in the event of an appeal.

Perry & Co. have offered their men terms under which, it is said, they could obtain better wages than are received by any other class of ordinary mechanics in the country. These offers have been rejected for three months, and the men declare they will never accept them. Perry & Co. have stated that they have no desire to reduce the income of their men. At the same time they say they must adjust their business to the depressed condition of trade throughout the country; to the reduced prices which their products command, and, above all, to the growing competition with Western manufacturers, which, as figures show, has reduced the volume of the stove business in Troy and Albany not less than one million dollars a year.

We learn from a member of the firm of Rathbone, Sard & Co. that they are now negotiating with the Ohio authorities, for a contract for the labor of convicts confined in the prisons of that State. They give as their reasons for this movement, that two of their men have been shot in the streets of Albany, and their business interfered with by order of the Molders' Union. This has satisfied them, they state, that their true policy is to get their goods manufactured out of Albany, or to remove their entire business to some point where they can be protected in its peaceable prosecution.

### Allowance for Loss on Muck Bar in Heating.

March 26, 1877.

Editor of *The Iron Age*.—DEAR SIR: In your issue of 15th instant your correspondent, "Eastern Pennsylvania," takes issue with "J. S. T." in regard to waste in working, and is, I think, himself in error in placing the loss in the heating furnace at 2½ per cent. on value of muck bar. I have never seen a record of less than 8 per cent. loss on a run of 6 to 12 months, when the iron given heaters was carefully weighed each day. If he does his heating on a loss of 2½ per cent., I will say that it is less than any mill ever heard of by

Yours, truly, WESTERN MILL.

M. Denarouze has invented a respirator for enabling firemen or others to enter and remain in places filled with smoke or gas, and where, under ordinary circumstances, a human being could not live. The respirator consists of a tube of much lightness, combined with great strength, having inserted near one end a small tin case containing two peculiar India-rubber valves—the one for inhaling and the other for exhaling air. The end of this tube, which has a mouthpiece, is cast over the fireman's shoulder, the other being led in the open air; and an India-rubber spectacle mask, capable of being molded to fit any features, having been placed over the eyes so as to compress the nostrils, the fireman may enter without fear the most vitiated atmosphere. The London, Glasgow, Dundee, Paisley and Aberdeen fire-brigades have been supplied with this respirator.

The curious observation has been made by Elmsasser that if a wire of magnesium be made the anode in a decomposition cell containing strongly diluted sulphuric acid, a wire of platinum being made the cathode, hydrogen gas is evolved at both electrodes, though at the anode only half as much gas appears as at the cathode, and that this ratio, though the total evolution of gas varies with the current strength, remains constant. The same result happens when, in place of the sulphuric acid, a moderately dilute solution of magnesium sulphate is used, only in this case magnesium hydrate is deposited at both electrodes.

# P. & F. CORBIN,

MANUFACTURERS OF

## BUILDERS' AND MISCELLANEOUS HARDWARE.

Factories, NEW BRITAIN, CONN., U. S. A.

Warehouses, NEW YORK, Nos. 87 CHAMBERS and 69 READE STREETS.

### Patent Improved Steep Beveled Rural Cupboard Turns.

MADE TO WORK EASY AND NOISELESS ON THE DOOR



Nos. 2243, 3043, 3045.

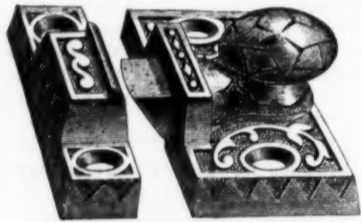


Nos. 2244, 3044, 3046.

No.	Description.	Per Dozen.	No.	Description.	Per Dozen.
2243	Solid Bronze Metal, with Screws to match	\$9 75	2244	Solid Bronze Metal, with Screws to match.	\$11 25
3043	Copal Bronzed with Bronze Metal Knob, with Screws to match,	3 25	3044	Copal Bronzed, with Bronze Metal Knob, with Screws to match.	3 75
3045	Copal Bronzed, with Bronzed Knob with Screws to match,	2 75	3046	Copal Bronzed, with Bronzed Knob, with Screws to match.	3 25

### Patent Improved Steep Beveled Cupboard Catches.

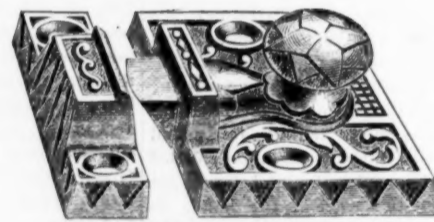
EASY SPRING AND NOISELESS. Regarded as the Best and Cheapest Cupboard Catch in Market.



Nos 2136 and 3136.



Nos. 2137 and 3137.



Nos. 2138 and 3138.

No.	Description.	Per Gross.	No.	Description.	Per Gross.	No.	Description.	Per Gross.
3136	Copal Bronzed, with Bronzed Screws.	\$10 00	3137	Copal Bronzed, with Bronzed Screws.	\$10 75	3138	Copal Bronzed, with Bronzed Screws.	\$11 00
2136	Solid Bronze Metal, with Bronze Screws.	3 00	2137	Solid Bronze Metal, with Bronze Screws.	3 25	2138	Solid Bronze Metal, with Bronze Screws.	3 50

We make same sizes PLAIN PATTERN JAPANNED and NICKEL-PLATED.

Improved Self-Locking

### BURGLAR PROOF SASH LOCKS.

Patent Applied for

No.	Description.	Per Dozen.
1316	Plain Pattern, Japanned.	\$3 75
1317	Plain Pattern, Brass.	12 50
1318	Plain Pattern, Nickel Plated with Screws to match	16 00
3316	Ornamental Pattern, Copal Bronzed, with Screws to match	5 00
4316	Ornamental Pattern, Solid Bronze Metal, with Screws to match.	16 00

By turning the Knob on end of lever arm slightly to the left, the lever is unlocked and swings back automatically.



Nos. 3316 and 4316.

### PATENT SASH LIFT AND LOCK.

A Gentle Pressure on the Lift releases the Catch.



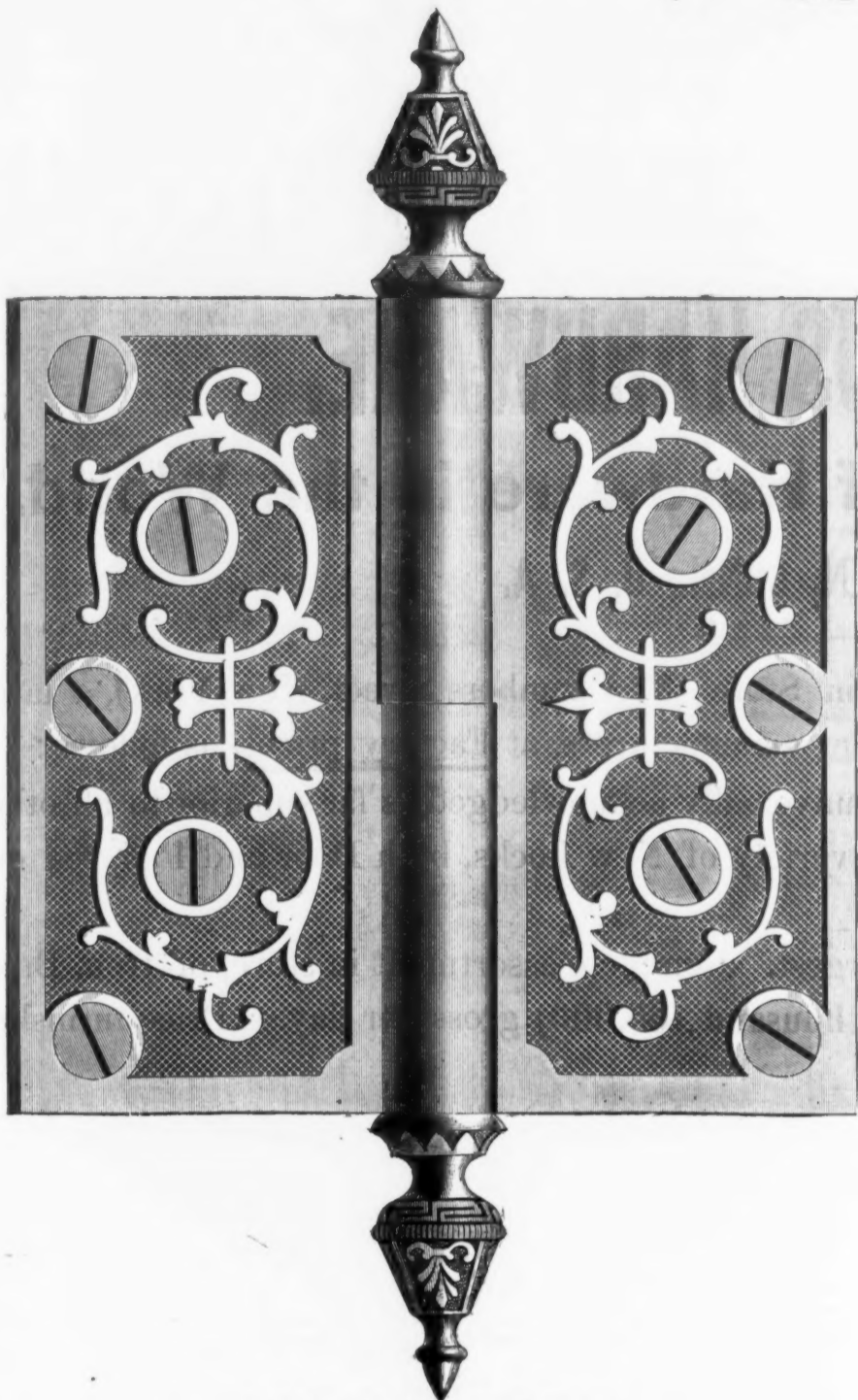
Nos. 3313 and 4313.

No.	Description.	Per Dozen.
3313	Copal Bronzed, with Screws to match,	\$2 50
4313	Solid Bronze Metal, with Screws to match,	5 00

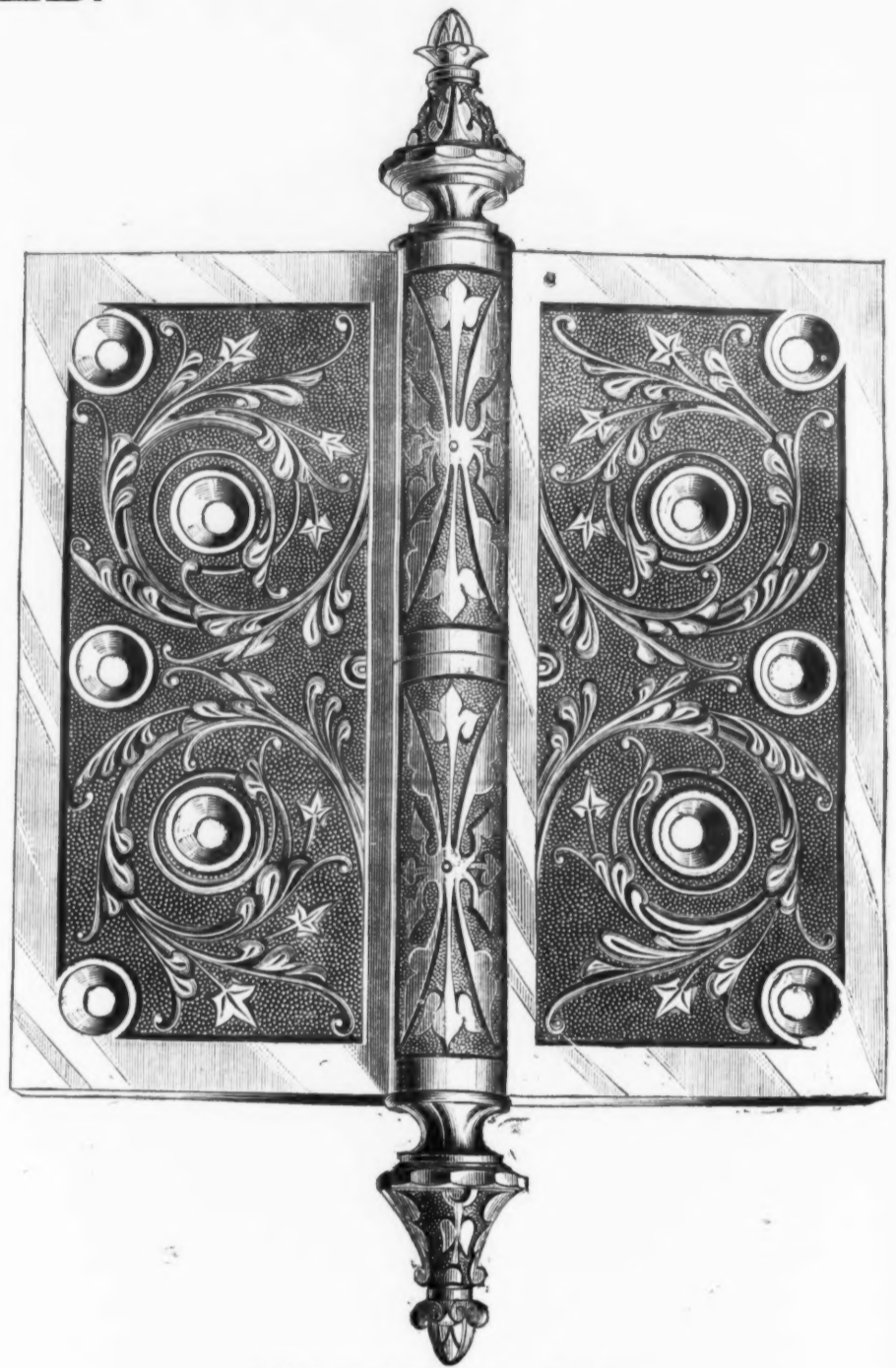
By reversing position, the above can be used as Pull or Lock for Upper Sash.

Discount on all the above same as our other Miscellaneous Goods.

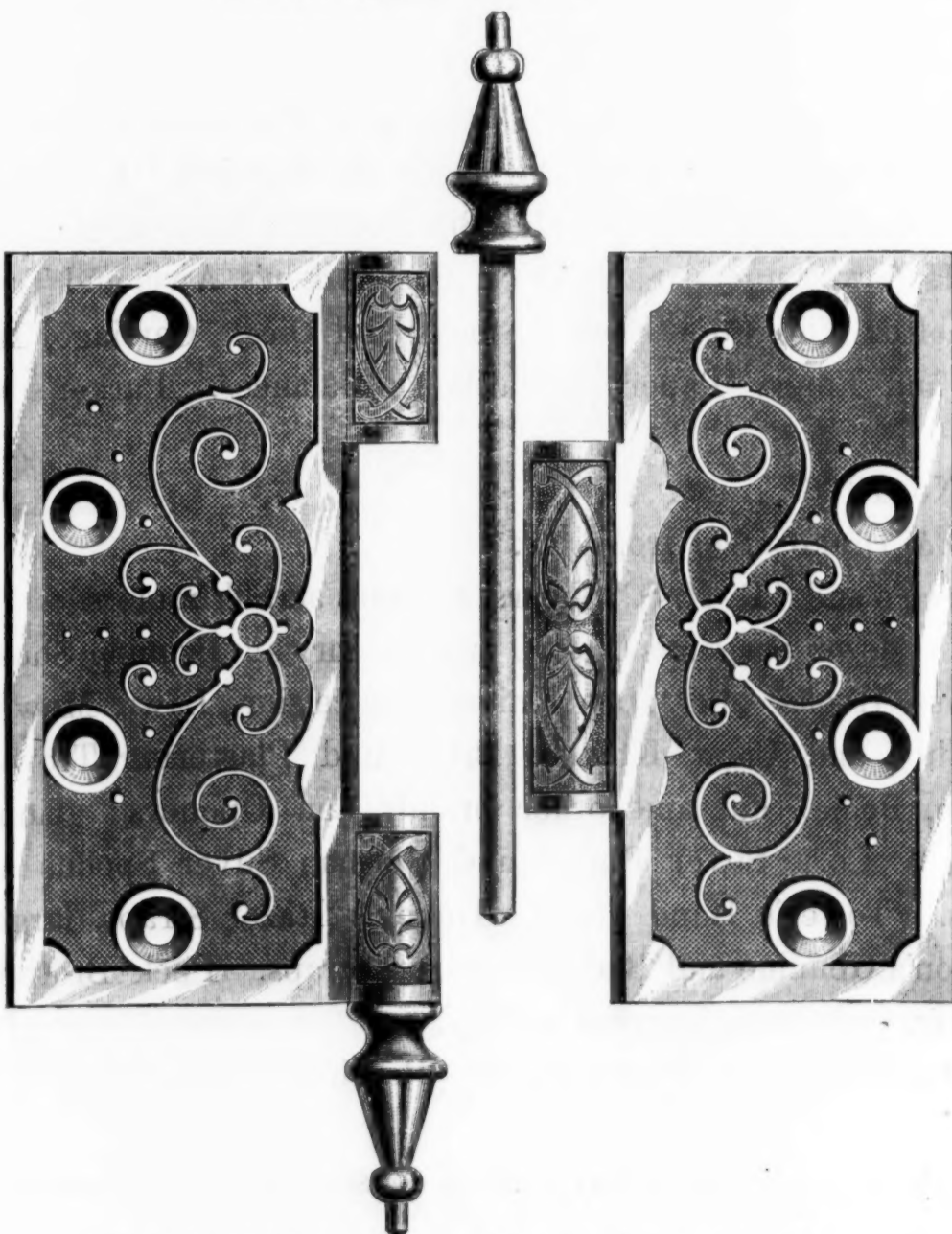
# P. & F. CORBIN, CONTINUED.



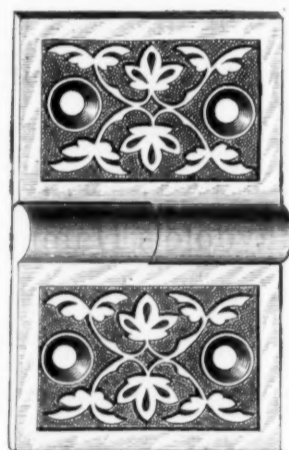
5x5 inch, No. 2, Solid Bronze Metal Butt.



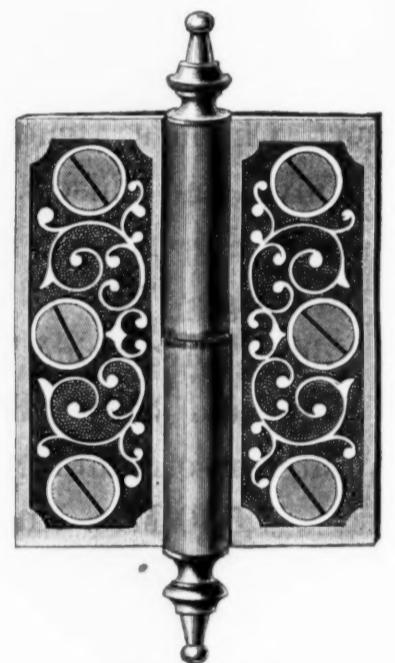
5x5 inch, No. 2½, Solid Bronze Metal Butt.



4½x4½ inch, No. 12, Plain Finish; No. 53, Japanned; No. 54, Japanned, Silver-Plated Tip.



1½x2½ inch, No. 8, Solid Bronze Metal Shutter Hinge.



2½x2 inch, No. 11, Solid Bronze Metal Shutter Hinge.

All the above Hinges are made in various sizes to meet the wants of the trade. Our Goods in Bronze Metal are finished in the following styles to Order, viz.:

- No. 2, Chemical Dark Bronze.
- No. 4, Enameled.
- No. 5, Nickel-Plated.
- No. 7, Nickel and Gold-Plated.
- No. 8, Gold-Plated.
- No. 9, Gold-Plated Enameled.

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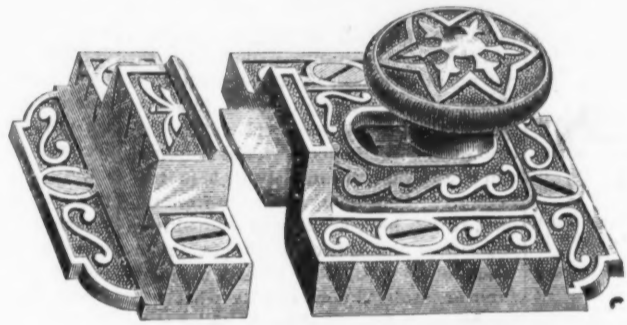
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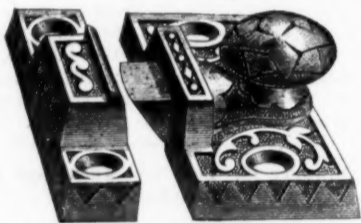


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2243	Solid Bronze Metal, with Screws to match . . . . .	\$9 75	2244	Solid Bronze Metal, with Screws to match. . . . .	\$11 25
3043	Copal Bronzed with Bronze Metal Knob, with Screws to match,	3 25	3044	Copal Bronzed, with Bronze Metal Knob, with Screws to match.	3 75
3045	Copal Bronzed, with Bronzed Knob with Screws to match, .	2 75	3046	Copal Bronzed, with Bronzed Knob, with Screws to match. .	3 25

### Patent Improved Steep Beveled Cupboard Catches.

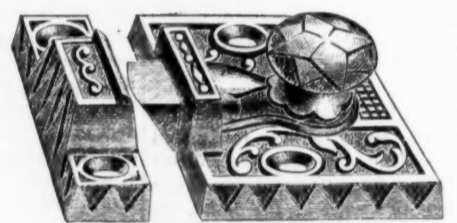
EASY SPRING AND NOISELESS. Regarded as the Best and Cheapest Cupboard Catch in Market.



Nos. 2136 and 3136.



Nos. 2137 and 3137.



Nos. 2138 and 3138.

No.	Description.	Per Gross.	No.	Description.	Per Gross.	No.	Description.	Per Gross.
3136	Copal Bronzed, with Bronzed Screws. .	\$10 00	3137	Copal Bronzed, with Bronzed Screws. .	\$10 75	3138	Copal Bronzed, with Bronzed Screws. .	\$11 00
		Per Dozen.			Per Dozen.			Per Dozen.
2136	Solid Bronze Metal, with Bronze Screws.	3 00	2137	Solid Bronze Metal, with Bronze Screws.	3 25	2138	Solid Bronze Metal, with Bronze Screws.	3 50

We make same sizes PLAIN PATTERN JAPANNED and NICKEL-PLATED.

Improved Self-Locking

### BURGLAR PROOF SASH LOCKS.

Patent Applied for

No.	Description.	Per Dozen.
1316	Plain Pattern, Japanned. . . . .	\$3 75
1317	Plain Pattern, Brass. . . . .	12 50
1318	Plain Pattern, Nickel Plated with Screws to match . . . . .	16 00
3316	Ornamental Pattern, Copal Bronzed, with Screws to match . . . . .	5 00
4316	Ornamental Pattern, Solid Bronze Metal, with Screws to match. . . . .	16 00

By turning the Knob on end of lever arm slightly to the left, the lever is unlocked and swings back automatically.



Nos. 3316 and 4316.

### PATENT SASH LIFT AND LOCK.

A Gentle Pressure on the Lift releases the Catch.



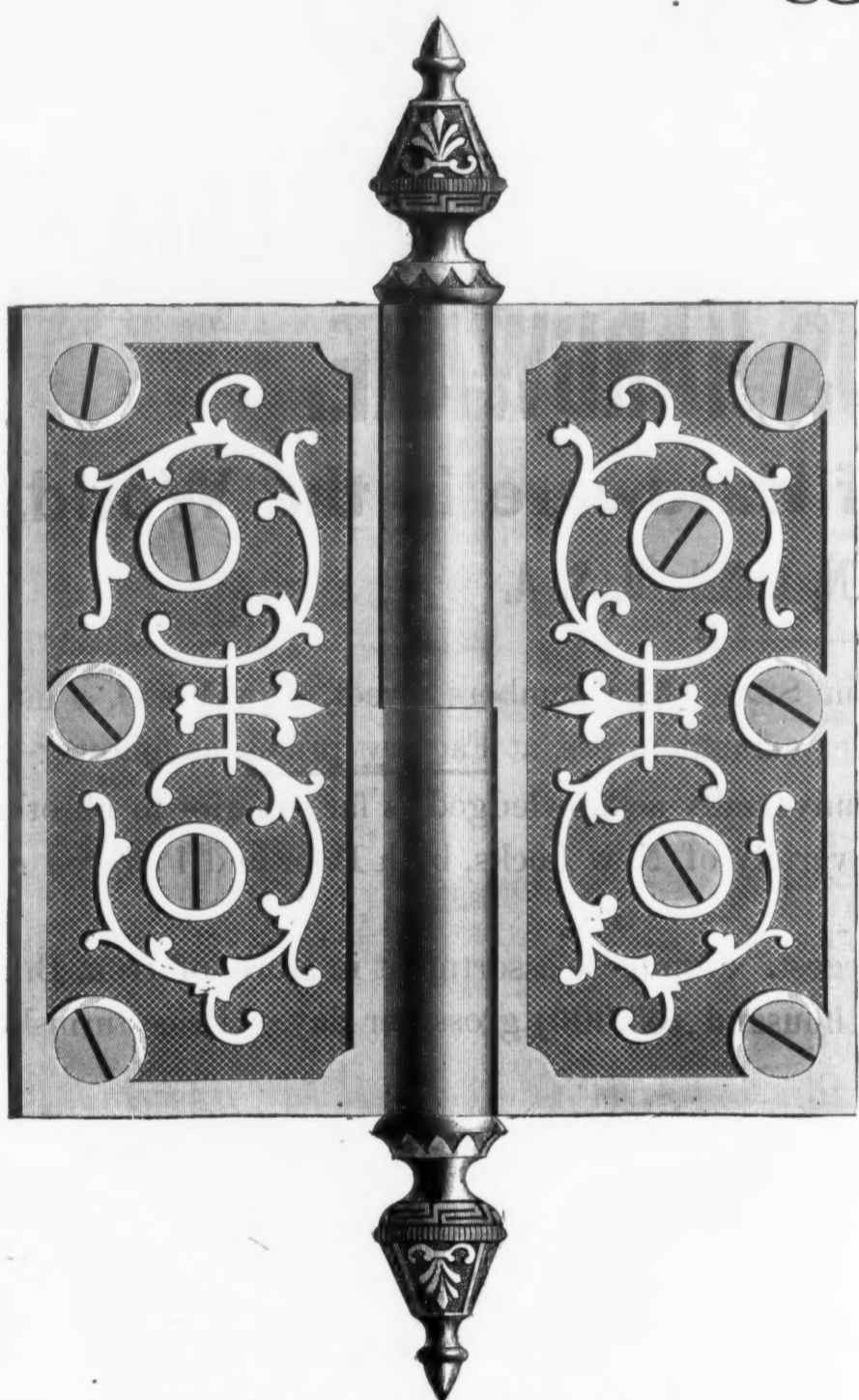
Nos. 3313 and 4313.

No.	Description.	Per Dozen.
3313	Copal Bronzed, with Screws to match, .	\$2 50
4313	Solid Bronze Metal, with Screws to match, .	5 00

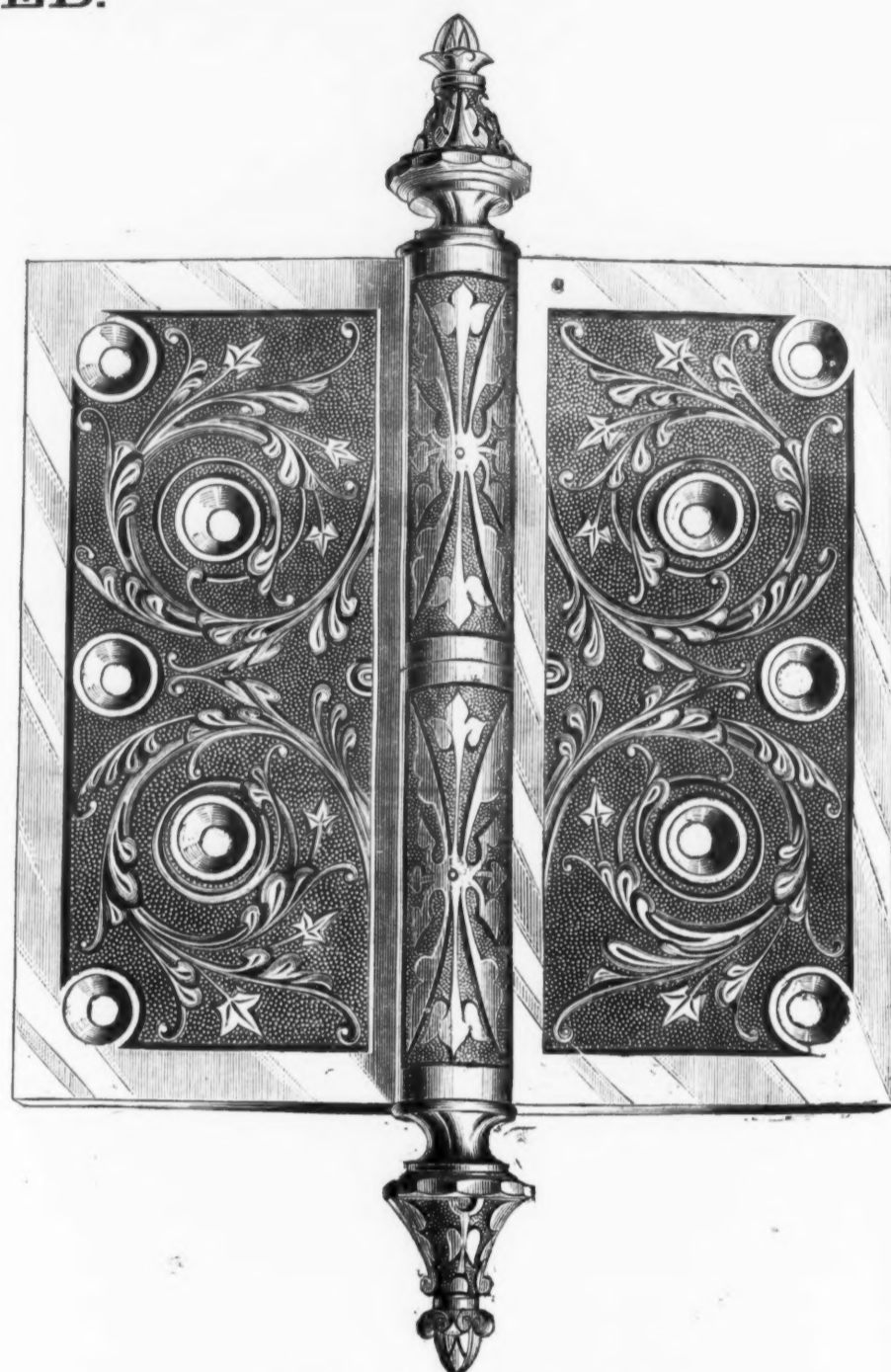
By reversing position, the above can be used as Pull or Lock for Upper Sash.

Discount on all the above same as our other Miscellaneous Goods.

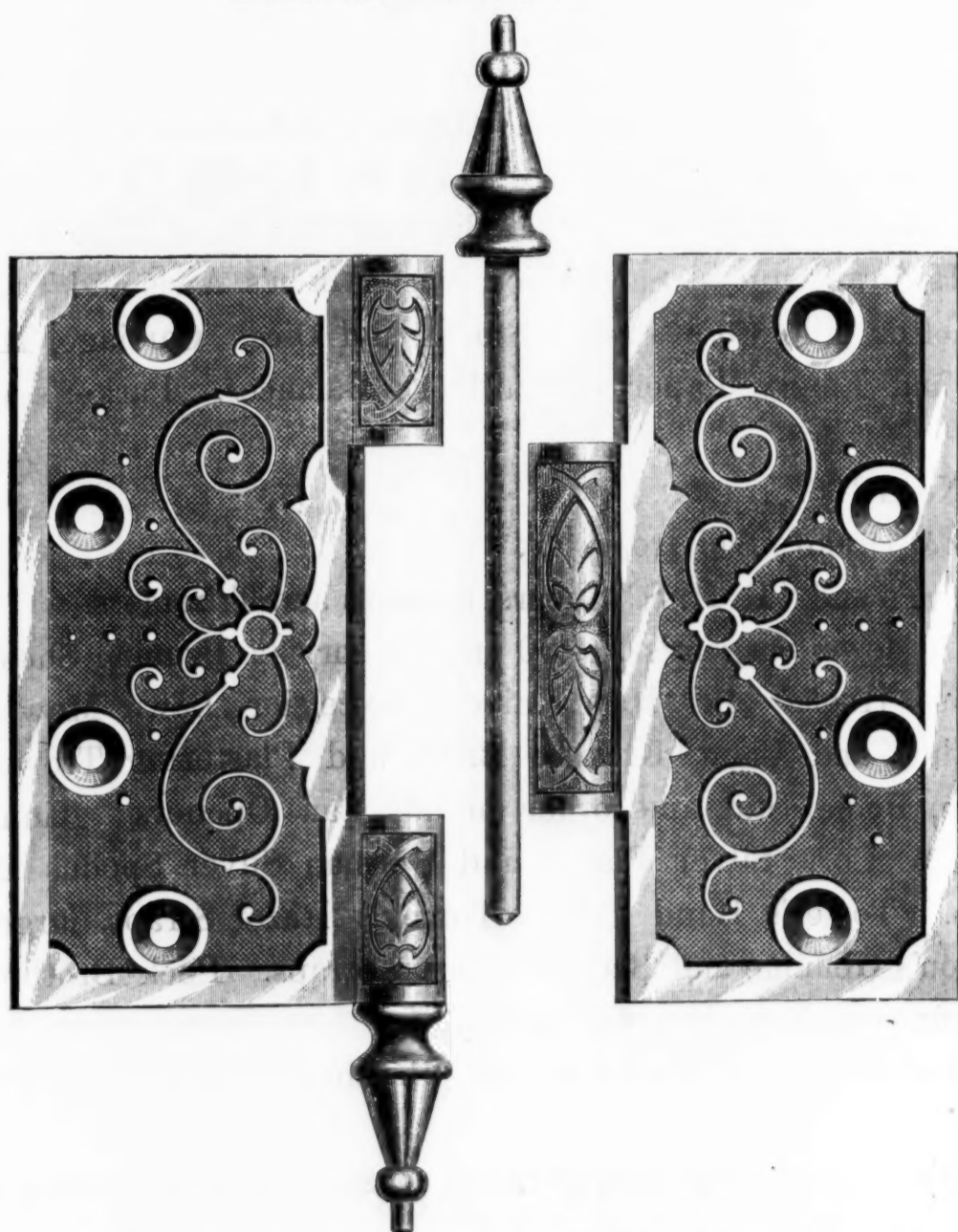
# P. & F. CORBIN, CONTINUED.



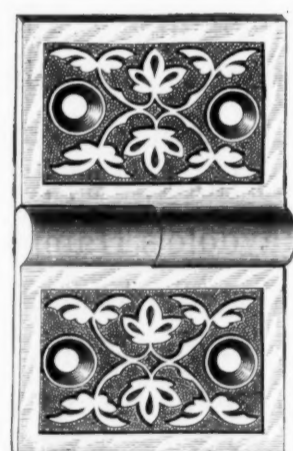
5x5 inch, No. 2, Solid Bronze Metal Butt.



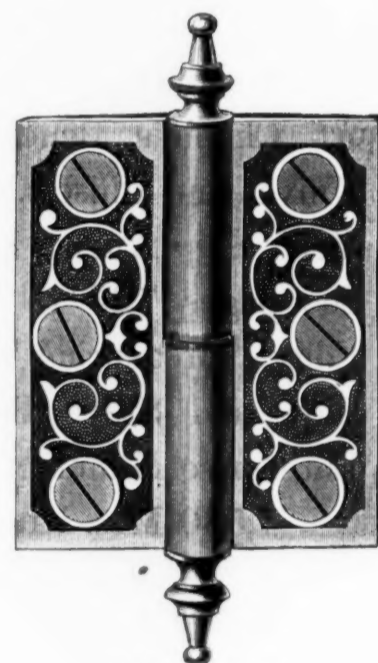
5x5 inch, No. 2 1/2, Solid Bronze Metal Butt.



4 1/2 x 4 1/2 inch, No. 3, Plain Finish; No. 53, Japauned; No. 54, Japauned, Silver-Plated Tip.



1 1/2 x 2 1/2 inch, No. 8, Solid Bronze Metal Shutter Hinge.



2 1/2 x 2 inch, No. 11, Solid Bronze Metal Shutter Hinge.

All the above Hinges are made in various sizes to meet the wants of the trade. Our Goods in Bronze Metal are finished in the following styles **to Order**, viz.:

- No. 2, Chemical Dark Bronze.
- No. 4, Enameled.
- No. 5, Nickel-Plated.
- No. 7, Nickel and Gold-Plated.
- No. 8, Gold-Plated.
- No. 9, Gold-Plated Enameled.

# SARGENT & CO.,

MANUFACTURERS OF

## BUILDERS', HOUSEKEEPING, CABINET, UNDERTAKERS' AND MISCELLANEOUS HARDWARE.

**Largest Manufacturers of Shelf Hardware in the World.**

**NEW YORK, AND NEW HAVEN, CONN., U. S. A.**

We are offering at reduced prices, from Factory and from Store (37 Chambers Street, New York), a large stock of goods of our own manufacture; and as Agents for other manufacturers, at Factory prices, as follows:

MALLORY, WHEELER & CO., Door and Pad Locks, universally acknowledged as far superior to all other brands. For full descriptions and illustrations, including great variety of New Locks, both Door and Pad, see our 1877 Catalogue, just published.

AMERICAN SCREWS, **ALL SIZES**, from smallest to largest. Complete assortment in store, of Iron, Brass and Blued, Flat and Round Head. Present supply **sixty-five thousand (65,000)** gross per day. Price furnished on application.

40,000 dozen Cabinet Locks at Manufacturers' prices and terms.

Full assortment of A. Field & Son's Tacks, Brads, Nails, &c.

20,000 lbs. Copper Rivets and Burs.

3,000 lbs. Copper Wire, assorted numbers.

100,000 square feet of Clinton Standard Wire Screen Cloth, green or drab, figured and landscape.

5,000 Leonard Bailey's "Victor" Iron Planes. Perfect in adjustment and construction, and by far the most popular in the market.

Large stock of all the following articles:

Chapin's Bench and miscellaneous Planes, Rules, Plumbs and Levels and Gauges. Crossman's Drawing Knives and Chisels. Ives' Augers, Bits, Gimlets, Bung Borers, &c. Morse Twist Bit Stock Drills. L'Homme-dieu's Ship Augers and Bits. Sargent's Compasses and Dividers, Diamond Gimlet Bits and Cast Steel Edge Tools. See pages 723 to 727, New Book, 1877. Stearns' Hollow Augers, Saw Vises, &c. Aiken's Awls and Tools. Eddy's Measuring Tapes. Maydole's Hammers. Nicholson File Co.'s Files. Stocks and Dies. Carriage, Tire, Plow and Stove Bolts. Baeder & Adamson's Sand and Emery Paper. Chatillon's Balances. Parker's and Enterprise Manufacturing Co.'s Coffee Mills.

1,500 Mrs. Knox's "Genuine" Fluting Machines, No. 1876.

1,200 dozen Zinc, Brass and Copper Oilers. Bless & Drake's Sad Irons, &c.

Mrs. Potts' Smoothing and Polishing Irons. Heinisch's and "R. H. S." Shears, Scissors and Trimmers.

1,500 dozen Hawley's C. S. Straight Trimmers. 300 dozen Sargent's No. 50 and "Henry's" Pruning Shears.

Also a complete assortment of Wadsworth Grass Hooks and Hay Knives; Excelsior Lawn Mowers, Tobacco Cutters, Cleavers, Mincing Knives, Ames' Shoe and Cigar Knives; Brick and Plastering Trowels. Sammis' Patent Lemon Squeezers. Dunlap, Sprague, Poole, Star and other brands Can Openers. Tinned Iron Spoons. Parkers' Albata Spoons. Hall, Elton & Co.'s Silver Plated and German Silver Spoons and Forks. Sargent's Thermometers. Glass Curtain Pins. Tower's Hand Cuffs. Torrey's Razor Straps, largely increased variety and superior quality. Charles Emerson's Genuine and Badger's Razor Straps. Peck Brothers' Brass Cocks. East Hampton Bell Co. and Gong Bell Mfg. Co.'s Bells in great variety.

Hotchkiss, Fitch and Lawrence Curry Combs. Maguire and J. Finley Smith's Brushes. Sargent's Cards, &c., &c., &c.

For full descriptions, illustrations and prices of all these goods and many others, consult our new Catalogue, now ready for distribution, for notice of which see next page.

# SARGENT'S "1877" CATALOGUE

## AND STANDARD PRICE LIST

### OF AMERICAN HARDWARE.

This Edition, about 900 pages, now ready for distribution to our customers, is more comprehensive than our previous issues, in consequence of the much greater variety of **GOODS MANUFACTURED AT OUR NEW HAVEN WORKS**, and the increased number of manufacturers represented by us as agents, whose goods are described and illustrated in this Book.

Though containing more pages than our last Book, by condensing the matter, we have been able to make it less bulky than our Catalogue of 1874.

Five hundred pages are devoted to SARGENT'S HARDWARE, the production of our own Factories.

After our own goods are MALLORY, WHEELER & Co.'s superior Door Locks and Trimmings, including Bronze Metal Work, Pad Locks, &c., all fully illustrated and clearly described, followed by lists and illustrations of Barnes & Dietz's and Langstroth & Crane's Locks—Cabinet Locks and Classified List of the "Gaylord" and "Eagle" numbers—Wrought Brass and Iron Butts, American Spiral Spring Butts, Blind Hinges and Fastenings. A. Field & Son's Tacks, Brads, &c. Holmes, Booth & Hayden's Copper Rivets and Burs.

AMERICAN SCREW Co.'s Iron and Brass Screws. Grilley's Capped Screws. Carriage, Tire, Plow and Stove Bolts. Shelton's Bed Screws. Holroyd Stocks and Dies. Nicholson's Files. Hammers of D. Maydole & Co. and Henry Cheney. Coes' Genuine Wrenches.

Sargent's Picks, Mattocks, Grub Hoes, Hatchets, etc. Hunt's Hatchets. Crossman's Drawing Knives and Chisels. L'Hommedieu's Ship Augers. Ives' Augers, Gimlets and Bits. Russell Jennings' Bits. Stearns' Hollow Augers. Aikens' Tools and Saw Sets, and great varieties of Mechanics' Tools of different manufacturers.

L. Bailey's "Victor" Adjustable Iron Planes. Chapin's Rules, Planes, Plumbs and Levels, &c. Baeder & Adamson's Sand Paper. Dixon's Pencils. Silver Lake Sash Cord, &c. Clement & Maynard's and Lothrop's Trowels. Chatillon's Balances. Enterprise Mfg. Co.'s and Parker's Coffee Mills. Bless & Drake's Sad Irons.

Knox Mfg. Co.'s Fluting Machines. Heinisch's and "R. H. S." Shears. Wadsworth's Grass Hooks and Knives. Excelsior Lawn Mowers. Hall, Elton & Co.'s G. S. and Silver Plated Spoons. Parker's Britannia Spoons. Large variety of House Furnishing Goods.

Torrey's, Emerson's and Badger's Razor Straps. Peck Bros.' Brass Cocks. East Hampton Bell Co. and Gong Bell Mfg. Co.'s Bells. Hotchkiss', Fitch's and Perfect Curry Combs. Maguire Brush Co.'s and J. Finley Smith's Brushes. Sargent's Cotton, Wool, Jim Crow, Horse and Mane Cards.

Concerning the distribution of these Books, we would say they are intended for our customers—either present or prospective—and not for promiscuous distribution nor for sale, (except when "extra copies" are wanted by customers) and hence they will be furnished to those only who deal exclusively in Hardware, and to such an extent as to make it seem probable that they buy in sufficient quantities to make them, if not so already, desirable customers for us; hence applications from strangers should be accompanied not only with information or references as to responsibility, but also as to amount of business.

We are obliged to use these precautions, which to some may seem arbitrary, because our system of selling goods at uniformly low and regular rates has given our prices such a reputation as standard authority, that they are sought for by those who are not entitled to them. We intend to be especially careful that our "Discount Sheets" do not get into the possession of those whose purchases are not of sufficient magnitude to make it advantageous for them to buy of Manufacturers.

Customers who are in immediate want of the Book, and who have at present no orders in our hands, will apply by postal card and inform us how to send it. It is too large to send by mail. New England, New Brunswick and Nova Scotia customers will please apply to SARGENT & CO., New Haven, Conn., or to MALLORY, WHEELER & Co., same place.

Extra copies, \$5 each, and applications for them must come from Principals, not Employes.

There are **Changes** in the designating numbers of a very few of our goods, and these new numbers will be used by us in invoicing, on and after April 2d.

# SARGENT & CO.,

NEW YORK, and  
NEW HAVEN, U. S. A.



# Trade Report.

Office of THE IRON AGE.  
WEDNESDAY EVENING, March 28, 1877.

The past week has been without event of much general interest in the financial markets. There are indications of an improved condition in the general markets, but not as yet of a healthy stimulus to activity. The money market is well supplied. The rates on call are 2 @ 3 per cent. On prime commercial paper the discount rate is 3 1/2 @ 5 per cent.

The fluctuations in gold during the week have been between 105 and 104 1/2, as shown below:

	Highest.	Lowest.
Thursday.....	105	104 1/2
Friday.....	104 1/2	104 1/2
Saturday.....	104 1/2	104 1/2
Sunday.....	104 1/2	104 1/2
Tuesday.....	104 1/2	104 1/2
Wednesday.....	104 1/2	104 1/2

The stock market has been strong in the main, but the downward tendency became noticeable toward the close, except in the coal stocks, which have improved in view of the prospect of a new combination among the producing and carrying companies. The principal speculation of the week has been in Lake Shore, D. L. & W. Western Union, Delaware & Hudson and Pacific Mail. We give below the closing quotations of active shares:

In the government bond market the old issues have been dull and steady. The only feature of interest noted during the week is the continued demand for the new 4 1/2 per cent. 600,000 of 5-20s. We give below the quotations of government bonds at the close of business to-day.

The bank statement shows a decrease in total reserve of \$842,500, the result of a loss of \$2,016,700 in the specie average, and a gain of \$1,173,900 in the legal tender note average. The latter shows that the currency movement from here to the towns in New England and the Middle States, where April 1st is annual settling day, has been less than reported, or that it began late in the week as to have little effect on the average for the six days. The surplus reserve is now \$11,390,200, against \$12,233,525 last week. The following is a comparison of the bank averages for the past two weeks:

	March 17.	March 24.	Differences.
Loans.....	\$259,257,100	\$259,690,300	Inc., \$438,100
Specie.....	\$24,407,900	\$23,391,200	Dec., 2,016,700
Legal tenders.....	\$2,280,100	\$4,454,000	Inc., 1,173,900
Deposits.....	\$21,817,900	\$21,820,000	Inc., 2,100
Circulation.....	\$15,588,900	\$15,732,100	Inc., 163,100

The foreign trade movements for the week are shown in the following tables:

For week ended March 24:

	1875.	1876.	1877.
Total for week.....	\$7,127,020	\$5,610,583	\$7,638,271
Previously reported.....	\$2,004,677	\$4,157,632	\$6,849,624

Since Jan. 1..... \$89,131,706 \$79,798,214 \$76,487,895

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Animals.....	100	\$808
Brass goods.....	11	1,629
Bronzes.....	3	389
Chains and Anchors.....	4	418
Copper.....	11,282	23,650
Cutlery.....	99	8,896
Gun.....	79	2,420
Hardware.....	43	1,271
Iron, pig, tons.....	4	3,408
Iron, sheet, tons.....	11	295
Iron, ore, tons.....	51	12,273
Metal goods.....	173	6,001
Needles.....	11	1,530
Old metal.....	1	602
Platina.....	1	6,827
Per. caps.....	48	16,191
Saddlery.....	4	2,776
Steel.....	1,001	11,117
Spelter.....	57,328	1,113
Silverware.....	4	9,112
Tin, boxes.....	4	62,652
Tin, 1387 slabs.....	65,652	605
Wire.....	605	9,112

EXPORTS EXCLUSIVE OF SPECIE.

For week ended March 27:

	1875.	1876.	1877.
For the week.....	\$4,170,069	\$4,449,173	\$3,952,107
Previously reported.....	\$3,885,021	\$5,621,776	\$6,656,912

Since Jan. 1..... \$38,905,090 \$60,070,949 \$67,611,029

EXPORTS OF SPECIE.

For week ended March 24:

	1875.	1876.	1877.
Total for week.....	\$131,428	\$131,428	\$131,428
Previously reported.....	\$131,428	\$131,428	\$131,428

Total since Jan. 1, 1877..... \$3,343,605

Same time in 1876..... \$1,630,929

Same time in 1875..... \$1,698,346

Same time in 1874..... \$2,530,874

Same time in 1873..... \$3,320,396

Same time in 1872..... \$4,613,383

Government bonds close as follows:

	Bid.	Asked.
U. S. Currency 6s.....	123 1/2	123 1/2
U. S. 6s 1881, reg.....	111 1/2	111 1/2
U. S. 6s 1881, cou.....	112 1/2	112 1/2
U. S. 6s 1885, reg.....	108 1/2	108 1/2
U. S. 6s 1885, cou.....	108 1/2	108 1/2
U. S. 6s 1885, new reg.....	108 1/2	108 1/2
U. S. 6s 1885, cou.....	108 1/2	108 1/2
U. S. 6s 1887, reg.....	111 1/2	111 1/2
U. S. 6s 1887, cou.....	111 1/2	111 1/2
U. S. 6s 1888, reg.....	113 1/2	113 1/2
U. S. 6s 1888, cou.....	113 1/2	113 1/2
U. S. 10-40 cou.....	110 1/2	110 1/2
U. S. 5s 1881, reg.....	110 1/2	110 1/2
U. S. 5s 1881, cou.....	110 1/2	110 1/2
U. S. 4 1/2s 1891, reg.....	106 1/2	106 1/2
Atlantic and Pacific Telegraph.....	23 1/2	23 1/2
Chicago & Northwestern.....	32 1/2	32 1/2
Chicago, Rock Island and Pacific.....	31 1/2	31 1/2
Chic. Bur. & Quincy.....	102 1/2	102 1/2
Col. & Ind. Cent.....	25 1/2	25 1/2
Clev. Col. & Ind. Indis.....	25 1/2	25 1/2
Cleveland and Pittsburgh.....	89 1/2	89 1/2
Chicago & Alton.....	91 1/2	91 1/2
Canton.....	13 1/2	13 1/2
Del. Lack. and Western.....	60 1/2	60 1/2
Delaware & Hudson Canal.....	51 1/2	51 1/2
Adams Express.....	109 1/2	109 1/2
American Express.....	53 1/2	53 1/2
United States Express.....	44 1/2	44 1/2
Wells, Fargo & Co. Express.....	83 1/2	83 1/2
Eric.....	54 1/2	54 1/2
Harlem.....	117 1/2	117 1/2
Hambam & St. Joseph.....	11 1/2	11 1/2
Illinois Central.....	41 1/2	41 1/2
Kansas Pacific.....	2 1/2	2 1/2
Lake Shore.....	43 1/2	43 1/2
Michigan Central.....	40 1/2	40 1/2
Morris & Essex.....	81 1/2	81 1/2
Milwaukee & St. Paul.....	18 1/2	18 1/2
Mariposa.....	43 1/2	43 1/2
N. Y. N. H. and Hart.....	123 1/2	123 1/2
New York Central.....	92 1/2	92 1/2
New Jersey Southern.....	1 1/2	1 1/2
Ohio & Mississippi.....	5 1/2	5 1/2
Pacific Mail.....	80 1/2	80 1/2
Panama.....	129 1/2	129 1/2
Pittsburgh and Fort Wayne.....	92 1/2	92 1/2

Pacific of Missouri.....	15	3 1/2
Quickilver.....	15	24
St. L., Kan. City Northern.....	9	4 1/2
Tol., Wabash & Western.....	24 1/2	47 1/2
Union Pacific.....	68	69
Western Union Telegraph.....	62 1/2	62 1/2

## MINING STOCKS.

Mr. Ogden Haight, No. 65 Wall street, sends us the following report of the business of the New York Mining Stock Exchange for the past week:

	Bid.	Offered.	Sales.
Alouez Mining Co.....	5 1/2	7 1/2	500
Atlantic.....	6 1/2	7 1/2	180
Calumet & Hecla Min. Co.....	180	181 1/2	37 1/2
Central.....	10 1/2	13 1/2	50
Franklin.....	3 1/2	4 1/2	1 1/2
Messard.....	2 1/2	3 1/2	1 1/2
Minnesota.....	2 1/2	3 1/2	1 1/2
National.....	2 1/2	3 1/2	1 1/2
Pewabic.....	2 1/2	3 1/2	1 1/2
Quincy.....	38 1/2	40 1/2	10
Ridge.....	3 1/2	4 1/2	1 1/2

	Bid.	Offered.	Sales.
Am. Flag G. M. Co., Col.....	97	100	100
Bobtail.....	145	150	300
N. Y. & Col.....	150	300	300
Lacrosse.....	29	30	2,300
Seaton Consolidated.....	4 1/2	4 1/2	4 1/2
Ophir, Nevada Gold & Silver.....	19 1/2	23	8
Belcher.....	6 1/2	8 1/2	5 1/2
Hale & Norcross.....	5 1/2	7 1/2	7 1/2
Sierra Nevada.....	5 1/2	7 1/2	7 1/2
Crown Point.....	7 1/2	8 1/2	8 1/2
Raymond & Ely.....	4 1/2	5 1/2	5 1/2
Consolidated Imperial.....	1 1/2	2 1/2	2 1/2
Justice.....	40	45	45
St. Joseph Lead Co.....	11 1/2	11 1/2	11 1/2

## GENERAL HARDWARE.

The demand for goods continues fairly active, although the wretched weather of the past week has had a very depressing effect upon local and near-by trade. The tone of the market is decidedly firm, and very few changes in values are reported.

A meeting of manufacturers and dealers in Hardware, Metals, Guns, &c., was held on Tuesday, 27th instant, at the store of the Charles Parker Manufacturing Co., in this city, to perfect an organization to be known as the Hardware Board of Trade, Limited, and to take steps for the immediate prosecution of its business. Among the gentlemen present were Messrs. Wiebusch, of Wiebusch & Hilger Hardware Co.; Corbin, of P. & F. Corbin; Boker, of Hermann Boker & Co.; Pope, of Thos. I. Pope & Bro.; Daly, of Schorverling & Daly; Breese, of Chas. Parker Mfg. Co.; Moore, of John P. Moore's Sons; Hungerford, of Wallace & Sons, and Gale, of Spies, Kessam & Co.

In addition to these the movement has the sympathy of many others of our leading houses. It is hoped through the instrumentality of this Board of Trade to perfect an organization in which manufacturers and wholesale dealers in Hardware, Metals and similar goods, will co-operate for the mutual protection of the trade. 1st, by checking the extension of credits to responsible parties; 2d, by preventing the commission of fraud in insolvent settlements and compromises; 3d, by diffusing information as to business standing and credit of buyers; 4th, by effecting a quick collection of past due claims and accounts. These and other objects may, it is hoped, be accomplished through this means. Similar associations existing in the furniture and other trades have met with great success, and are of practical value to the membership. The wide extent and large interests of the Hardware and Metal trades make such an organization peculiarly desirable. On Tuesday next, April 3d, a preliminary meeting will be held, and on the following Tuesday, 10th proximo, the first annual meeting of "The Hardware Board of Trade, Limited," will be held, at which the association will elect its officers. We hope to give our readers further information on this subject, and in the meantime we refer those who may feel an interest in the matter to any of the gentlemen mentioned above, who will gladly explain the proposed workings of the organization.

The long pending Bit Brass suits between the Miller's Falls Co. and Wm. A. Ives have just been decided in favor of the Miller's Falls Co. We are informed that all their patents involved are fully sustained, and all the Grip Braces which Mr. Ives has made in the last six years are declared to be infringements. The case was long and ably contested on both sides, and the result, unless reversed, will enable the Miller's Falls Co. to make short work of other infringers, and give them practically the control of the Brass business.

Sargent & Co. have now ready for distribution their new 1877 catalogue. This book is similar in shape to their catalogue of 1874, and contains about 100 more pages. The paper on which the new book is printed is thinner than in their old edition, and the matter all through has been greatly condensed, so that although the variety of goods presented is largely increased, the book is not so bulky as the old catalogue. Five hundred pages are devoted to goods of their own manufacture, following which a considerable portion is occupied by Mallory, Wheeler & Co.'s Locks and Trimmings, which are very fully and comprehensively illustrated. In this connection we notice the condensed lists for Mortise Knob Locks, which are models of ingenious arrangement. They also illustrate Barnes & Dietz Locks and Latches, Gaylord Manufacturing Co.'s Cabinet Locks, and a large assortment of Carpenters' Tools and miscellaneous Hardware. The book is handsomely printed, and the illustrations from beginning to end are first-class. It is substantially bound in cloth with leather back and corners. For fuller particulars as to its contents and the manner of distribution, we refer

our readers to their advertisement on pages 18 and 19.

Russell & Erwin Mfg. Co. are the sole agents for Cushman's Patent Improved Universal Hollow Auger. This is a new and late improvement on the old Cushman Universal Hollow Auger, which is well known in the market. It is very well made, and is claimed to be superior to any other tool for the purpose. The cutters are so made that they can be ground instead of filed, and can therefore be tempered as highly as any other cutting tool. The price is \$4.50, less 20 per cent. discount.

Clark's Blind Butts have been advanced from discount 60 and 10 to discount 60 per cent. Rowland's Shovels and Spades are quoted in this market discount 50 per cent.

The demand for Nails is unsatisfactory to holders, occasioned partly by the inclement weather, which renders transportation a difficult matter. The price of these goods is nominally \$3 per keg for 10d., to 60d., less 25 cents per keg to the trade. This price, however, is not lived up to, and orders are easily placed at \$2.65 net, and for large lots this figure would be shaded a trifle. We learn by telegraph that the Western Nail Association held a meeting to-day at which the price was reduced to \$2.60 for 10d., and for 300 keg lots, \$2.50.

The following letter from the Girard Wrench Mfg. Co. fully explains itself:

GIRARD, PA., March 26, 1877.  
To the Editor of The Iron Age—DEAR SIR: We wish you would contradict the item now in circulation that "The Girard Wrench Mfg. Co. is being crushed out of existence, and is in the hands of the sheriff." We do not owe to exceed three hundred dollars, and are prepared to pay that when called for; have a reasonable bank account; pay our men promptly every Monday; have to work nights to keep up with our orders, and hope that none of our customers will be deceived by the malicious item. Yours, respectfully,  
GIRARD WRENCH MFG. CO.

The Wilson Mfg. Co., of New London, Conn., have already notified the trade that after the 1st proximo they will discontinue their office and salesroom in this city. J. Clac Wilson & Co., No. 81 Beekman street, have made arrangements to carry in stock a full line of their Hardware manufactures after that date, and will furnish price lists and discounts on application.

The attention of the trade is invited to the advertisement of J. B. Shannon, of Philadelphia, on page 27. Mr. Shannon manufactures the following specialties for fine dwellings: Locks in great variety, Dumb Waiters, French Window Bolts, Secret Spring Latches, Bronze Door Trimmings, &c., &c.

The following joint circular explains itself:  
NEW YORK, March 21, 1877.  
We have this day removed our New York warehouse and office to 81 and 86 Chambers street, and have arranged with the Wiebusch & Hilger Hardware Co. to hereafter represent us.

Our Mr. Wight has connected himself with the above firm, and we are prepared to execute orders from this office at same prices and terms as from factory.

WESTERN FILE CO. (LIMITED).  
F. FOSHAY, Treasurer.  
Our Stock of Files, both "Western" and "Economy," is now complete, and we can fill all orders promptly.

WIEBUSCH & HILGER HARDWARE CO.  
A. B. Parker, agent of Anderson & Passavant's Steel, has removed from his old stand in John and Cliff streets, which he occupied for 20 years, to No. 21 Astor House, where he will be pleased to meet his friends in the trade. He informs us that the bridge contract does not interfere at all with his business, and he is prepared to fill all orders entrusted to his care promptly.

We invite the attention of Hardware manufacturers to the advertisement signed "Hardware," on the opposite page. The gentleman who has placed the advertisement is a man of large experience in the introduction of American goods. He proposes visiting South America and Australia in the interest of American manufacturers, and solicits correspondence from makers of goods suited to the requirements of those countries.

The Schierloh Mfg. Co., No. 79 Morgan street, Jersey City, N. J., manufacturers of "Cherry-Heat Welding Compound," have reduced the trade price of this article to 20 cents per pound, less discount 25 per cent. The compound is put up in one pound tin packages and in five and ten pound wood packages.

The manufacturers of Oilers have adopted a new price list, which is subject to the following discounts:

	Per cent.
Brass and copper.....	4
Oil and Automatic.....	40
Zinc and Tin.....	45
Zinc, Tin and Brass, with drip cup.....	45

We print below the new list for these goods, issued by Edward Miller & Co., No. 35 Warren street. The lists of the other makers have not yet been given to the trade:

	Per doz.
No. 0, Stamped Tin Oilers.....	\$1.00
No. 1, ".....	1.25
No. 2, ".....	1.50
No. 3, ".....	1.75
No. 4, ".....	2.00
No. 5, ".....	2.25
No. 6, ".....	2.50
No. 0, Spun Zinc Oilers, Tin Bottom.....	1.00
No. 1, ".....	1.25
No. 2, ".....	1.50
No. 3, ".....	1.75
No. 4, ".....	2.00
No. 5, ".....	2.25
No. 6, ".....	2.50
No. 0, Spun Brass Oilers.....	2.25
No. 1, ".....	2.50
No. 2, ".....	2.75
No. 3, ".....	3.00
No. 4, ".....	3.25
No. 5, ".....	3.50
No. 6, ".....	3.75
No. 0, Copper Oilers.....	2.50
No. 1, ".....	2.75
No. 2, ".....	3.00
No. 3, ".....	3.25
No. 4, ".....	3.50
No. 5, ".....	3.75
No. 6, ".....	4.00

	Per doz.
No. 0, Tin Oilers, with Drip Cup, Tin Bottom.....	1.75
No. 1, ".....	2.00
No. 2, ".....	2.25
No. 3, ".....	2.50
No. 4, ".....	2.75
No. 5, ".....	3.00
No. 6, ".....	3.25
No. 0, Zinc Oilers, with Drip Cup, Tin Bottom.....	1.75
No. 1, ".....	2.00
No. 2, ".....	2.25
No. 3, ".....	2.50
No. 4, ".....	2.75
No. 5, ".....	3.00
No. 6, ".....	3.25
No. 0, Brass and Copper Oilers, with Drip Cup.....	1.75
No. 1, ".....	2.00
No. 2, ".....	2.25
No. 3, ".....	2.50
No. 4, ".....	2.75
No. 5, ".....	3.00
No. 6, ".....	3.25
No. 0, Tin Oilers, Automatic.....	2.40
No. 1, ".....	2.65
No. 2, ".....	2.90
No. 3, ".....	3.15
No. 4, ".....	3.40
No. 5, ".....	3.65
No. 6, ".....	3.90
No. 0, Zinc Oilers.....	2.40
No. 1, ".....	2.65
No. 2, ".....	2.90
No. 3, ".....	3.15
No. 4, ".....	3.40
No. 5, ".....	3.65
No. 6, ".....	3.90
No. 0, Brass Oilers.....	2.40
No. 1, ".....	2.65
No. 2, ".....	2.90
No. 3, ".....	3.15
No. 4, ".....	3.40
No. 5, ".....	3.65
No. 6, ".....	3.90
No. 0, Brass Oilers.....	2.40
No. 1, ".....	2.65
No. 2, ".....	2.90
No. 3, ".....	3.15
No. 4, ".....	3.40
No. 5, ".....	3.65
No. 6, ".....	3.90</

SHEFFIELD, Eng., March 12, 1877.

THE POLITICAL ATMOSPHERE

having now cleared considerably, both in the far East and the far West, people are beginning to hope that trade will feel the benefit of

(From our Regular Correspondent.)

THE POLITICAL ATMOSPHERE

having now cleared considerably, both in the far East and the far West, people are beginning to hope that trade will feel the benefit of

the change before long. The settlement of your presidential question is, by most of us, regarded as a favorable incident, and one which should have a tendency to bring people from politics to business. It cannot be denied, however, that there is a good deal of disappointment in many circles here at the defeat of Mr. Tilden. I do not suppose that one person in a hundred knew anything whatever of the merits or defects of either candidate, but the traders here, without doubt, wished Mr. Tilden to win, because they had the idea that the Democrats favor free trade, and would be willing to run a bill through Congress either to abolish some of your present import duties or to lighten the incidence of many of them. In the East matters appear rather brighter, save and except a discordant note, struck this morning by one of the foreign correspondents of a London journal, who says that Bismarck is not only treading on the toes of the French, but is inquiring as to what the intentions of Russia and Austria are. In the meantime,

TRADE PROSPECTS  
do not brighten much at the time being, and there is not any material alteration from the situation described in my last week's communication. In some directions I hear of a disposition to harder quotations for iron, while in others, especially in Staffordshire, finished iron is said to be easier to buy, and is not unlikely to be lowered, say 10/ a ton, at the April quarterly meetings. *Nous verrons.*

EMPLOYERS AND WORKPEOPLE.  
The National Federation of Employers of Labor had an important question before them at a meeting held in London last week, under the presidency of Mr. John Robinson (Sharp, Stewart & Co., Manchester). This was the subject of the liability of employers for injuries sustained by their workpeople while pursuing their ordinary avocations. The field of discussion opened up was so wide that it was decided to hold a general conference on the subject as soon as possible.

SEVERAL SERIOUS EXPLOSIONS  
have had to be chronicled among the principal events of last week. That at the Great Bays Colliery, Tydesley, Lancashire, resulted from a blown out "shot," and caused the death of six miners, while that at the Worcester New Pit, of the Landore Siemens Steel Company, near Swansea, Wales, caused the death of 18 men, but its origin is not distinctly traced at present. Near Sheffield, too, a boiler exploded and very badly injured five workmen at the steel and file works of Smith, Boyd & Co., Sharrow Vale, beside reducing a rolling mill to a complete wreck.

STEAM ON TRAMWAYS  
is just now a question prominently before both the public and Parliamentary Committees. Generally speaking, the public approve of the mechanical working of the tramways, while the municipalities which represent them, with a strange inconsistency, strongly oppose the introduction of steam engines as substitutes for horses. This is the case at Sheffield and other large towns and cities. The House of Commons have appointed a Select Committee to inquire into the matter, and the committee have already taken some evidence. Mr. Farrar, permanent secretary of the Board of Trade, is the principal witness so far, and he says that under the act of 1870 upward of £2,000,000 have been expended on tramways, of a total authorized length of 317 miles, of which 161 are already opened. In the case of Wantage, where the tramway ran principally by the side of a railway, permission had been granted to use an engine which must not be run at a speed exceeding eight miles an hour. A similar permission had been granted to the Vale of Clyde tramways. I may say that it is supposed that the committee will report favorably with these checks.

FOREIGN COMPETITION AGAIN!  
I shall presently forswear this subject, so many people are drumming upon it, but I almost feel compelled to note the remarks addressed to a Sheffield meeting by the Reverend Samuel Earnshaw, M. A., who was the Senior Wrangler of his year (30 or 35 years ago), and who is an accomplished mathematician, as well as a skillful political economist. The reverend gentleman's idea was that the 1851 Exhibition opened the eyes of our foreign competitors so much that they had since pushed on so energetically and with such success that some of them ran us a close race. Some of them even—such as France, Germany, Belgium, China, Japan and Austria—were sending us goods, and the Americans claimed to beat the British as manufacturers, although the British claimed to beat the whole world. He proceeded to administer a sharp reproof to the trades unions for their unwise and idiotic policy in certain respects, and also rapped the knuckles of manufacturers for their efforts to "get rich in a hurry." He, of course, recommended a more thorough education as the only true remedy for the decadence of our prosperity, and thought that with it we should continue to lead the world.

SHEFFIELD WAGES IN 1874.  
Very late in the day—as must inevitably be the case where any return is left to the "energies" of the Titic Barnacle family—a return has just been issued, by Parliamentary authority, as to the rates of wages in 1874. The figures are, however, worth a mention as a record of an exceptional time. In Sheffield the steel converters average 4/ for 10 hours' work; the steel melters, 7/ for about the same time; the pullers out, 5/; cokers, 3/6; mold getters up, 3/; pot makers, 4/; weighers up, 4/6; laborers, 3/6; scrap carriers, 4/; rod rollers, 8/; rod furnacemen, 5/; sheet rollers, 9/; furnacemen, 6/; foremen, 7/6; tilers, 6/; millwrights, 5/; turners and fitters, 5/4; roll turners, 5/6; blacksmiths, 5/; strikers, 3/8; engine tenders, 4/6; firemen, 3/4; locomotive men, 5/; carters, 3/8; gas makers (for steel), 3/9; grinders, 5/4; forge laborers, 3/6; sheet rollers, 4/6; and unlovers, 4/6, all working 9 or 10 hours daily. Have these figures been reliable where they would have been most invaluable? but if they are all understated, as are many of the above, they are worthless. In reference to Sheffield wages at the time under notice, I have no hesitation in saying that the wages are understated.

THE FEBRUARY EXPORTS,  
as set forth by the Board of Trade returns, are again unfavorable, to the extent of 12½ per cent., as compared with the same month of last year. Pig iron increased 1100 tons, mostly to the States (which took 4200 tons), Holland and Belgium; angles, etc., increased 300 tons, the tonnage sent to the United States having been 145 tons. Railroad augmented 1700 tons, chiefly with India and Australia, the United States having taken 67 tons. Hoops, &c., fell off 900 tons, the States' quota having been 136 tons. Tin plates fell off 1400 tons, the United States being down 7534. Cast or wrought iron shows a growth of 2300 tons, the States having taken 125 tons. Unwrought steel the United States had 313 tons out of a total of 1600 tons, a decrease of 80.3 tons.

HARDWARE AND CUTLERY			
	1875.	1876.	1877.
To			
Russia.....	1,541	437	354
Germany.....	15,474	16,415	14,394
Holland.....	5,641	7,498	7,307
France.....	10,555	10,870	8,676
Spain and Canaries.....	7,578	4,991	8,735
United States.....	10,468	37,399	30,511
Spanish West India Islands.....	8,819	7,365	8,871
Brazil.....	24,924	20,443	16,044
Argentina Republic.....	6,746	5,397	3,792
British North America.....	14,461	9,017	6,598
British India.....	16,054	27,015	24,844
Australia.....	50,308	58,161	39,351
Other countries.....	86,481	66,293	57,925
Total.....	297,132	291,891	215,793

THE REMAINING COMPARISONS  
are not very instructive, and I shall dismiss them by saying that steam engines fell off £70,000; machinery and millwork, £83,000; brass, 2000 cwt.; unwrought copper, 1200 cwt.; wrought copper, 2100 cwt.; lead, 28 tons; and zinc, 900 cwt.; while tin shows an increase of 150 cwt. The new mode of returning the rail exports, so as to distinguish between iron and steel, is of interest, although the board of officials say that it is not absolutely reliable, owing to the difficulty of procuring returns.

IRON RAILS.				
Month ended February.				
1876. 1876.				
To	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Tons.	£
Russia.....	3,165	23,296	66	497
Sweden & Norway.....	1,862	14,143	85	385
Spain.....	1,902	13,396	598	4,468
Italy.....				
United States.....	605	4,440	1,178	7,034
Brazil.....	11	90	15	110
Chile.....				
North America.....				
British India.....	3,170	24,115	2,415	14,515
Australia.....	1,208	7,819	1,416	9,974
Other countries.....	2,197	16,687	1,783	12,071
Total.....	13,940	103,846	7,526	48,972

STEEL RAILS.			
Month ended February,			
1876.		1877.	
To	Quantity, Tons.	Value, £.	Quantity, Tons.
Russia.....	3,542	31,869	194
Sweden & Norway.....	34	271	157
Germany.....	1,099	9,895	1,099
Spain.....	1,380	508	4,227
Italy.....	416	4,241	1,388
United States.....	11	90	15
Brazil.....	1,208	7,819	1,416
Chili.....	2,197	16,687	1,783
British America.....	119	1,320	1,388
Batavia, India.....	1,341	11,977	1,423
Australia.....	416	4,241	1,694
Other countries.....	1,441	11,977	1,423

The total quantity of iron and steel rails exported during the month was 15,749 tons of the aggregate value of £121,655.

SCOTCH PIG IRON  
has remained in a very quiet condition during the whole of the week which has elapsed since I last wrote, and all brands are rather weaker in price, although the total shipments are still up to a very fair average. Freight from Glasgow and Ardrossan to your ports are as heretofore. The stock in Connal's stores now amounts to 130,377 tons, as against 62,990 tons at the same period of last year, the former aggregate showing an increase of 1408 tons on the week. Writing from Glasgow on March 9, Messrs. James Watson & Co. said: "The warrant market has been depressed this week with a large business doing down to 54 1/2¢ cash, closing, however, firm at 54 1/4¢ per ton. Shipments last week were 8630 tons, against 9,644 tons in the corresponding week of 1876." We quote as under:

	No. 1.	No. 2.	No. 3.
S. M. B. at Glasgow.....	56/	58/	59/
Gartsherrie.....	61/9	55/3	55/3
Coltness.....	62/	55/	55/
Summerlee.....	60/6	55/6	55/6
Langloan.....	62/6	55/6	55/6
Carnbroe.....	57/6	54/	54/
Calder, at Port Dundas.....	62/	54/	54/
Glenarnock, at Ardrossan.....	60/6	55/6	55/6
Eglington.....	56/6	52/6	52/6
Dalmellington.....	56/6	52/6	52/6
Shotts, at Leith.....	62/	56/6	56/6
Kinnell at Bo'ness.....	56/6	53/	53/

Messrs. John E. Swan & Bros., Limited, same date, quote Gartsherrie No. 1 at 61 1/4¢; Coltness No. 1, 64 1/4¢; Glenarnock No. 1, 60 1/4¢; and Eglington No. 1, 56 1/4¢.

SCOTCH IRON AND STEEL.  
The Scottish malleable iron trade is now fairly well engaged, and one of the principal plate mills has been placed on a double shift. At the Cambuslang Steel Works there is a very considerable output of steel rails.

MR. RUSKIN'S LATEST  
is one of the finest pieces of sublime bathos ever penned by mortal man. This is what he says about architecture, iron floors, lecturers and steam tramways—a portentous combination of select adjectives: "Your present system of education, is to get a rascal of an architect to order a rascal of a clerk-of-the-works to order a parcel of rascally bricklayers to build you a bestial stupid building in the middle of the town, poisoned with gas, and with an iron floor which will drop you all through it some frosty evening; wherein you will bring a puppet of a Cockney lecturer in a dress coat and a white tie, to tell you smugly there's no God, and how many messes he can make of a lump of sugar. Much the better you are for all that when you get home again, aren't you?" On steam tramways he writes: "As I was beginning again to walk in happy thought beside the courses of quiet rivers that wind around the low hillsides above our English fields, behold the *Lincoln Gazette*, triumphant in report of art exhibitions and competitions, is put into my hand, with this notable paragraph: 'It is some little time since I was, to the scornful of all else, a steam engine was used for the first time on Wednesday in drawing tram cars through the crowded streets of Sheffield. The tramways there are about to dispense with the whole of their horses, and to adopt steam as the motive power.' And doubtless the Queen will soon have a tramway to Parliament, and a kettle to carry her there, and steam-horse carriages to escort her! Meantime, my pet cousin's three little children have just had a Christmas present made to them of a real live donkey; and are happier, I fancy, than either the Queen or you. I must write to congratulate them; so good-by for this time, and pleasant drives to you."

TRADES OF SHEFFIELD  
Since I last wrote, an event, which has been expected for some little time past, has occurred, and may be taken to be indicative of what is coming in other directions before long. I allude to the difficulties of Mr. Samuel Witham, of the Calder Vale Iron Works, Wakefield, whose creditors met on Friday last at the Great Northern Hotel, Leeds, for the purpose of deciding what steps should be taken in the face of Mr. Witham being unable to retire his bills. At this meeting a statement of accounts was read by Mr. Dean, accountant, which showed liabilities amounting to something over £80,000, with assets of about similar value. It was stated that the present depression of trade was the cause of the creditors being called together, and on behalf of Mr. Witham a proposal was made to form the concern into a "limited" company, or to carry the works on under in-

spection, there being a valuable trade connection with a number of good orders on hand. The creditors, however, decline both these suggestions, and are stated to have decided that a petition in bankruptcy should be at once presented, at the same time nominating five of their number to act as a committee in the matter. From what I hear, I am afraid that several other stoppages of one kind or other will have to be recorded within the next three months, and I should not be greatly surprised if some of them were in the coal trade.

Since my last report was penned, pig iron has been rather easier all round, both in respect of foundry and forge numbers. The current prices of "Alfreds" are these: No. 1, 54 1/2¢; No. 2, 52 1/2¢; No. 3, 51 1/2¢; No. 4, 50 1/2¢; No. 5, 49 1/2¢; all per ton f. o. r. at Leeds or Hunslet. North Lincolnshire brands are steady, at prices varying from 50/ to 60/ according to quality and brand. In Derbyshire and South Yorkshire kinds there is very little alteration, and no great quantity is changing hands in the open market here, although I believe several lots are going every week into other districts. In hematite pigs, too, it would appear that the current activity of the Bessemer departments is insufficient to keep up quotations, inasmuch as I have this week to record a drop of not less than 5/ per ton in some brands. Maryport hematite No. 1 is now 70/; No. 2, 67 1/2¢; No. 3, 65 1/2¢; No. 4, 65 1/2¢; No. 5, mottled and white, 65 1/2¢; Bessemer No. 1, 70/; No. 2, 67 1/2¢; and No. 3, 65 1/2¢; all these figures being down 5/ and all less 2 1/2¢ for prompt cash. In Millom and other West Coast brands there is no change. Some of the principal North Derbyshire and South Yorkshire concerns the foundry departments are rather more fully engaged, two or three of them having recently secured some fair sized orders for gas, water and steam pipes, as well as for tubing for lining colliery shafts. Pipes for water works purposes, with sockets, and coated in the customary manner, can now be had at very low prices—indeed, I hear of recent purchases having been made at something like 25 per cent. There is a moderately steady, but by no means large, call for some classes of manufactured iron, notably bridge girders and girders for builders' uses, with certain other sorts of constructive ironwork. Merchant iron is still in an almost utterly neglected condition, although some producers are offering bars at 46, and plates in proportion, free in trucks. At the Midland Iron Works, Maseborough, the whole of the laborers have come out on strike against a proposed lowering their wages 10 per cent. from £1 a week. Some little inconvenience has resulted. At the Railway Wagon Works, of Messrs. Harrison & Camm, near Rotherham, a dispute exists, owing to the employers having notified a reduction of 3/ per wagon. At several local collieries, too, there are disputes, but they do not in any case affect the course of trade. Among the companies' transactions of the week I notice the declaration of a dividend of 7 1/2 per cent. by John Harrison & Co., Sheffield, and of 10 per cent. by John Round & Co. At the shareholders' meeting of Brown, Bayley & Dixon, at Sheffield, on Tuesday, very hopeful views on the position and prospects of the company were expressed, and Mr. C. B. Holland, managing director, said the present year had opened hopefully, the orders on the books being of considerable extent, and up to the present time there was a large increase in the amount of work turned out in the principal departments as compared with the corresponding period of last year.

An extraordinary general meeting of the shareholders of the Universal Railway and Carriage Spring Co., Limited, was held on Monday for the purpose of raising £2000 in debentures. The chairman expressed confidence in the future of the company, and several letters were read from railway companies approving the plan. It was decided to raise the required additional capital. At the latter end of last week the price of best coal at Leeds was lowered from 17/1 to 15/10, and of seconds coal from 15/10 to 14/7 per ton. In this district all kinds of house coal are extremely cheap, and steam coal is plentiful, but slack is getting extremely scarce and dear—a natural result of the limited output of large coal. In country there is very little business doing, even by the best houses. I hear that Rodger & Sons and a few other firms are doing next to no business—comparatively speaking—with the States, although I believe that Canada and the British North American provinces are yielding some orders for best goods. I hear that Messrs. Harrison Bros. & Howson's new spring kiln manager, vice Mr. Hunter, who is leaving, after many years' service, is Mr. Needham, who is doubtless well up in his work.

BIRMINGHAM AND STAFFORDSHIRE.  
There is no change in the iron trade of these districts, except that one or two of the houses producing special brands report themselves in receipt of more numerous inquiries. Prices are unchanged. In hardware there is some little business, but nothing approaching to what may be called a spurt. A local journal says that many complaints are being received by houses there as to the bad quality of goods made there and elsewhere in this country. It is intimated that Australian merchants get gun nipples not bored out at all, that in parcels of one gross nominal each there are only eleven dozen, that hand sewing machines are packed with sawdust instead of straw, that the makers of the machines that some of the said sewing machines are " rubbish," and that trace chains are sent out to the Antipodes which are found to weigh 19 to 28 pounds less than they ought to do. These things, I venture to suppose, are better managed in America.

SOUTH WALES AND MONMOUTHSHIRE  
remain in much the same condition as heretofore. Last week 288 tons of sheet iron went to Holland, 152 tons of bars to Palma, and about 200 tons of rails to Liqueure. Of coal the export was about 100,000 tons. The Ebbw Vale proprietary now own the British Iron Works, Aberystwyth, and have restarted two furnaces there. Rails are going from Downals to Roas, and the same works are using Spanish ore very largely, as well as ore from Devonshire.

THE METAL MARKETS  
are still quiet, and values have a tendency to further decline. At the Cornish ticketing last week 1336 tons of copper ore realized £562, the average produce being 6½¢, and the yield of fine copper 92 tons 6 cwt., the average standard being £101. 9/. The annual report of Muntz Metal Company shows a profit for the year of £21,253, yielding a dividend at the rate of 10 per cent. per annum. Von Dadelzen & North report: "Copper.—Chili bars have dropped about 22 per cent., and the market has been in a sensitive state. The charters for the last 14 days of February were announced as 2100 tons, of which 1450 tons in bars and ingots and 550 in ores and regulus, for the United Kingdom, and 100 tons bars for the Continent. About 1000 tons g. o. b. changed hands at a shade under £70, closing steadily at £70. Wallaroo is lower, and vainly offered at £77. 10/ for delivery ex next sale. Burra has been sold at £75. 10/ cash. A public sale of 400 tons of the latter is announced for the 20th inst., to follow the Wallaroo sale. English is flat and inactive. We still quote tough £77 to £78; best select, £78 to £79; and strong sheets, £83 to £84. Tin has been sold. Straits sold at £71 to £72 1/2, closing at the latter. In Australia, late sales have been made at £70. 10/ to £71. 10/ for delivery, better £70. 5/ to £70. 10/ Banca.—The Trading Company's sale is au-

nounced for the 28th inst., and to consist of 23,500 slabs, rather a larger quantity than was expected. The closing price is 42 1/4¢. Billiton sold to a small extent at 42 1/4¢; English ingots, £74 to £75. Tin plates remain very dull. Lead steady, £20 12/6 to £20 15/ for ordinary Silesian. Quicksilver, £7. 10/ asked; possibly for a good order a shade less would be taken. The price was reduced this afternoon to £7 5/.

Antimony flat, £52 to £53.  
The Mining Journal says: "Copper.—The decline in the value of this metal daily increases, and there seems no limit at present to the reduction. The confidence which importers showed in the market by adhering to their stocks has suddenly disappeared, and several large lots of Chili have recently been sold, but although a considerable business has been transacted, yet prices still go lower, and sellers seem now quite resolved to sell out as fast as possible. While sellers are frantic buyers must be cautious, and wait awhile to see to what extent their excitement will carry them. At the rate sellers are going on, Wallaroo and Burra will very soon reach £70, and then perhaps they will come to their senses and stop their wild career. Chili has been sold at £69. 12/6, short prompt. Burra is quoted at £75; Wallaroo, £77; tough, £76. Lead.—The firmness of the market continues, and sellers sustain prices against all attempts to reduce them. Spanish has been sold at £20. 17/6. Spelter.—Silesian is quoted 2/6 to 5/ per ton lower than last week. Quicksilver.—Business on a moderate scale has been done at £7. 10/ for Spanish until to-day, when £7. 5/ was accepted. Tin Plates.—The demand keeps sluggish, and prices show no signs of advance. Tin.—Our market closed last week at £71. 10/ for Straits, and £70. 5/ for Australian, and on Monday the only change was 5/ less for Australian. On Tuesday Straits declined to £71, but recovered 5/ on Wednesday. Yesterday there was a stronger feeling, and £71. 10/ was paid for Straits on the spot, and £72 for arrival. Australian participated in the advance, and realized £70. 5/ to £70. 10/. The market closes to-day at £70. 10/ for Australian, and £71. 10/ for Straits. Liverpool prices are unchanged.

Iron: f. o. b. in Liverpool, per ton.			
	£ s. d.	£ s. d.	£ s. d.
Merchant bar.....	6 15 0	6 7 0	6 10 0
Merchant bar, in Wales.....	6 5 0	6 6 0	6 10 0
Saffordshire.....	7 5 0	9 15 0	0 0
Hoop.....	8 9 0	9 0 0	0 0
Sheet.....	9 0 0	10 0 0	0 0
Nail rod.....	7 10 0	8 0 0	0 0
Bar, best grown.....	7 5 0	8 0 0	0 0
Boiler plates.....	9 5 0	10 0 0	0 0

Tin Plates: f. o. b. in Liverpool, per box.			
	£ s. d.	£ s. d.	£ s. d.
Charcoal, I. C.....	88 0 0	1 7 0	0 0
Coke, I. C.....	0 19 0	0 1 2	0 0

Copper: Delivered in Liverpool, per ton.			
	£ s. d.	£ s. d.	£ s. d.
Bolt and Sheathing.....	88 0 0	0 0 0	0 0 0
Tin.....	81 0 0	0 0 0	0 0 0
Tough cake.....	81 0 0	0 0 0	0 0 0
Best selected.....	83 0 0	0 0 0	0 0 0

#### Scientific and Technical Notes.

Among the most important specimens of military engineering in Europe are  
THE IRON FORTIFICATIONS AT SHEERNESS.

Concerning these works *Ryland's Iron Trade Circular* says: The iron casemated fort at Garrison Point, Sheerness, is one of the most important works effected by military engineers. The powerful modern fortifications with which our naval arsenals are to be protected date practically from 1859, when the Royal Commission on National Defense entered upon their deliberations. To the late Sir John Burgoyne and several eminent officers of the Royal Engineers is due the credit of the idea of employing iron armor for the protection of coast batteries. The present powerful fort is one of the earliest devised masonry forts, with iron shields for closing their embrasures. Provision has been made in this fort for 44 heavy rifled guns, commanding the Channel and Medway, and accommodation is given for 360 men. Nearly 13 years have been required to erect, armor and arm this fort. There are two tiers of casemates—one above the other—and both have their iron shields continuous from the lower to the upper batteries, thus affording superior protection to the guns and garrison of the fort. The gun casemates are 41 ft. from front to rear, with a space of 24 ft. between the guns. The sea face of the piers and arches is of Cornish granite, and the inner work is of brickwork in Portland cement; the rear of the casemates being open. Each gun casemate is screened off by a light partition of wood (which is movable), and inclosed behind with light wood paneling and glazed windows, to form habitations for the men, all so hung as to be capable of being opened during the firing of the guns, the sails swinging on their centers in a horizontal position. The magazines and shell stores for the guns are completely sheltered, being on the basement below; and they are so arranged that the guns have their ammunition immediately below them, and their service facilitated by the use of powder and shell lifts, and by the most modern appliances for moving heavy projectiles. The lighting of the magazines is effected by means of light chambers passing over the magazine passage from the light passage behind it. A verandah has been formed all round the work, the floor of which is of slate. There are three sets of circular stairs, from the basement to the second gun floor, formed of granite diagonal steps. The tereplein is covered with asphalt, on which the Admiralty have a signal tower, flag station and land beacon light erected. A lookout station has also been formed on the northeast end in connection with the galleries, giving shelter from the ricochet fire, and enabling the officer in charge of the firing to give directions to the gunners working the guns in the casemates below by means of speaking tubes. The gorge of the work is inclosed by a wall of Cornish rag masonry, flanked by caponnières, and within this wall are the guard room, lockup, cells, cook house, ablution room and coastguard buildings. The fort is garrisoned by the Royal Artillery, who mounted the guns, and who have fired them as in service—fought, as it were, in action—in order to ascertain the effect the firing would produce on the fort; this was considered highly satisfactory, little or no damage being done. The works on their completion, a few days ago, were handed over to the War Department by the contractors, Messrs. Henry Lee & Sons, Westminster.

A discovery, unparalleled in its extent, has recently been made of

ANCIENT COINS  
near Verona, Italy. Two large amphore have been found containing no less than 600 English pounds weight, of coins of the Emperor Gallienus and his successors within the hundred years following his reign. The number of coins is estimated at between 50,000 and 55,000. Of those of the Emperor Probus there are more than 4000. The majority are of bronze, but there are some of silver and others of bronze silvered (*suberate*). They are all in the finest state of preservation, and, with the exception of those of Gallienus, which are a little worn, they are so fresh from the mint as to make it evident they were never put into circulation. The discovery has been considered of sufficient importance for the Minister of Public Instruction to dispatch Signor Pigorini specially to Verona to report upon it. All the finest examples are to be placed in the Museum of Verona, and the remainder either exchanged in sets with other museums or sold as may be decided upon.

The following upon the

SOLVENTS OF CAOUTCHOUC  
or India-rubber is very valuable: Of the solvents of caoutchouc, its distillate caoutchoucine may be placed at the head of the list; the others best known are pure chloroform, carbon disulphide, rosin oil and coal naphtha, rectified oils of turpentine, gutta percha, tar, lavender, sassafras, cocoten, rosemary, amber, ambereupion, terebene, benzene—C<sub>12</sub>H<sub>10</sub>—hydrochlorate of terebene, benzole—C<sub>12</sub>H<sub>8</sub>. Anhydrous oil of turpentine dissolves 49 per cent. of caoutchouc. A mixture of 6 to 8 per cent. of absolute alcohol and 100 of carbon disulphide is an excellent solvent. Sulphuric ether, which alone is but a poor solvent, dissolves rather more, if about 5 per cent. of anhydrous alcohol be added thereto. Hot alcohol dissolves out about 4-7 1/2 per cent. of a soft resin. It is sparingly soluble in hot fused oil—hydrate of amyl C<sub>10</sub>H<sub>21</sub>HO; readily at a gentle heat in melted hog's lard, or in very hot whale oil. After swelling up in oil of turpentine or in naphtha it is soluble in hot linseed oil.

The East abounds in gums, oils and resins of great value in the arts, many of which are but slightly known. Very recently the properties of a

NEW VEGETABLE OIL  
have been brought to notice: The Tong-Yeou, a tree which flourishes in China and Cochinchina, produces, in large quantities, a fruit affording a capsule filled with rich, oil-yielding kernels. The oil allows itself to be readily extracted by pressure; it has a density of 0.9362, and possesses a number of remarkable properties. According to recent investigations, this oil dries more rapidly than any other known oil, a film of the same, on a clean glass or metal surface, becoming quite dry after several hours. One of its most notable properties resides in the fact that, simply under the influence of light, the atmosphere being excluded, it becomes solid. It likewise solidifies when warmed in the air; this last phenomenon, however, is of chemical nature, having its origin in oxidation. The attempt will be made, it is said, to domesticate the Tong-Yeou in Algeria, where its valuable product will be more available for the purpose of commerce.

Recently some figures concerning the

DURABILITY OF SHEET ZINC  
have been going the rounds of the papers, from which we quote as follows: "As zinc is an easily oxidizable metal, it has been suspected that it could not last long for a roof; but the fact is that the film of oxide soon formed over its surface is quite a perfect protective coating, effectually preventing further oxidation. This film is water-proof and firmly adhering, and this is the cause of its protective capacity. Zinc differs in this respect very much from iron, of which the coating of oxide formed by exposure to moist air, is very porous and has not the adhesive quality, so that it is easily shaken off partially, while the moisture and air penetrating under it find a stronger hold, and, as it were, into the metal still more at every place where a rust spot covers it. Observation and experiments with exposed zinc have proved the extreme slowness of its oxidation, and the German *Zeitschrift für Gewerbe* reports that the data verified led to the deduction that a sheet of zinc 1-50 of an inch would occupy 1243 years in complete oxidation. A weight of 130 grains of zinc spread over the surface of a square foot would make a layer only 1-5000 of a line thick. If the sheet be 0-25 line thick, there will be 46-04 such layers; and this multiplied by 27, gives 1243

ing up some of the smartest fore and aft sailors in the world, who might be found invaluable as a reserve in time of war. We also notice that the collier class is not provided for. This is a type of vessel peculiar to itself, and hardly coming under the class of screw steamers for cargo only, but one which has, perhaps, improved as much as, if not more than any other vessel in the merchant navy. A special prize has been offered by the well known barge builder, Mr. Wood, for the best river tug capable of towing 300 tons—that is, about six barges—at a rate of four miles an hour. Perhaps as soon as the nature of the exhibition becomes known, the omissions noticed will be supplied, by gentlemen interested in yachting and the coal trade, to each of whom the best type of vessel for their own line, wide apart as they lie, is a matter of paramount importance. The prizes offered vary very much in value, from a silver medal alone, to a gold medal, the freedom of the Shipwright's Company and 50 guineas, which is what the first prize for ocean going steamers consists of. The models and drawings will be exhibited in Fishmonger's Hall, the exact date is not fixed; it will probably take place some time in June or July. Mr. A. Sedgwick Woolley, the secretary of the Institution of Naval Architects, has been appointed honorary secretary of the exhibition, and intending exhibitors will be able to obtain information as to the rules of competition, &c., by communicating with him at 20 John street, Adelphi, London.

One of the English collieries was the scene of the rather novel employment of

**DIVERS IN A COAL MINE,**  
which had been drowned out. One shaft had been flooded since the beginning of the year; and the pumps having failed to raise the water to the furnace coal level, there were over 20 yards of water in the pit, which is 100 yards deep. It was necessary that the pumps should be repaired, and for the first time in the history of colliery enterprise divers were employed for the purpose. A scaffold was erected down the shaft about 50 yards from the surface and 30 above the level of the water, and on this the air pump and diving apparatus were fixed. The divers were George Smith and his son from London. The younger man descended into the water, while his father remained at the air-pump and attended to his signals. The work was accomplished in two shifts of two hours each. Crowds of colliers watched with great anxiety the appearance and disappearance of the diver with his helmet and dress. The proprietors of the collieries have suffered much loss from the flooded state of the pit, which will again be opened in a day or two.

A calculation, made 40 years ago, stated that for home use and for export purposes, 20,000,000 lbs. were required daily in England. The real quantity now produced is 50,000,000 POUNDS PER DAY, of which Birmingham produces 37,000,000, leaving 13,000,000 as the production of London, Stroud and Dublin, where pigs are also made. The weight of wire consumed annually in the pig manufacture of England is about 1275½ tons, or 2,857,130 lbs., one-eighth of which is iron wire, used in the manufacture of ironing and hair-pins. The brass wire consumed amounts to 2,500,000 lbs., which at 11d. per lb. in money value reaches the sum of £114,583. The iron wire consumed is 344,800 lbs., its value £718. 6/6, and to be added to these amounts are the wages, paper and ornamental boxes, wear and tear of machinery, manufacturers' profits, &c. Mourning, hair, entomological and "pupered" pins—i. e., stuck in rows—release a larger profit than pins sold by weight. Taking it altogether, the pig manufacture of the United Kingdom is not overestimated at the aggregate amount of £200,000. Of course the reader asks the old conundrum, "What becomes of them?" The answer is easy, yet people who ask do not seem to remember the answer. They rust out. Corrosion ends them; probably more than 90 per cent. of all that are made disappear from this cause alone.

Some of the newspapers are always ready when a bit of good ancient metal work or other art product is discovered to cry out "A lost art," usually because they do not happen to know how the work was done. This has been the case lately with some of the fine flagree jewelry in the Castellani collection in this city, and the papers insisted such work cannot be produced at the present day. Our answer to this is that we have seen modern work of the same kind made within the last five years. It is not difficult to get an idea of the methods employed by the ancients if we investigate the operations of the itinerant goldsmiths who produce some of the

**FINE EASTERN METAL WORK,**  
and with the crudest of tools: A low earthen pot full of chaff or sawdust, on which he makes a little charcoal fire; a small bamboo blow pipe about 6 inches long, with which he excites the fire, a short earthen tube, or nozzle, the extremity of which is placed at the bottom of the fire, and through which the artist directs the blast of the blow pipe; two or three small crucibles, made of the fine clay of ant hills; a pair of tongs; an anvil; two or three small hammers; a file, and, to conclude the list, a few small bars of iron and brass, about 2 inches long, differently pointed, for different kinds of work. It is astonishing what an intense little fire, more than sufficiently strong to melt silver and gold, can be kindled in a few minutes in the way just described. Such a simple portable forge deserves to be better known. It is, perhaps, even deserving the attention of the scientific experimenter, and may be useful to him when he wishes to excite a small fire, larger than can be produced by a common blow pipe, and where he has not a forge at command. The success of this little forge, it may be necessary to state, depends a good deal on the bed of the fire being composed of combustible materials, and a very bad conductor of heat.

## INDUSTRIAL ITEMS.

### MASSACHUSETTS.

The Merrimac Silver Mining Company, at Newburyport, have struck a vein of gray copper south of their shaft, the richest one yet discovered, assaying as high as \$6000 per ton. J. W. Gardner, for twenty years superintendent of the cutlery works at Shelburne Falls, has resigned to engage in the manufacture of pocket cutlery on his own account, and H. O. Smith, who has worked in the office nearly as long, succeeds him.

E. Stowell, of North Adams, who is interested in the manufacture of the duplex magnet machines for electric light, proposes the use of that light for the Hoosac Tunnel.

The New England Glass Company, of East Cambridge, one of the largest in New England, has voted to wind up its business, being unable to compete with Southern and Western concerns. Two hundred men will be thrown out of employment.

### CONNECTICUT.

Considerable pig iron is moving over the Housatonic Railroad just now. It is brought to Bridgeport and shipped by water to different places, most of it going to Jersey City.

Steel rails are being put down on the Lake Shore Line division of the Consolidated road between Saybrook and New London, and the whole division is being put in the best possible condition.

The coal platform on the new dock in New London is to be 275 feet long, 30 feet wide and 14 feet high. It is to be arranged so that work can be carried on from four hatches of the vessel at the same time, and it is calculated that a 1600 ton vessel can be unloaded in 24 hours. It is the intention to load the coal on cars immediately, but there will be ample accommodations to store a cargo on the platform should occasion arise. Work is to be commenced at once, and the platform completed early in April.

The Housatonic Railroad Company will continue the laying of steel rails this summer. The Russell & Erwin Company, of New Britain, it is stated, will soon build a rolling mill for the manufacture of wire.

The Derby Silver Company have in contemplation the building of a new factory. The Housatonic Water Company have offered them a good location free, and a majority of the owners are in favor of building. Their present factory is not as well calculated for their business as they wish.

### NEW YORK.

Plovers are to be made at Rome from Nes silicon steel.

The rail mill at Rome is idle, with no prospect of resuming.

The Troy Times says: Business at the Iron Works is evidently reviving. The Star Forge, Steel Works and the Rensselaer Rail Mill of the Albany and Rensselaer Iron and Steel Works are running, beside Burden's Steam Mill and the upper factory mill. This week the remaining mills will light up, and for the first time this season all the mills at the Iron Works will be running.

Fires have already been started at the iron foundry of Southard, Robertson & Co., Peekskill; also at the foundry of Montross, Lent & Pollock. A reduction of 10 per cent. has been made in the wages of the molders.

The machine shops of the Rome Iron Works and the Adams Machine Shop, Rome, are running to their full extent, making Laughland's patent wrought iron door frames and furnace bushes, with orders ahead for some time.

Mr. A. B. Parker, agent of Messrs. Anderson & Passavant, has removed his office from 12 Cliff street to Room 21, Astor House. Up to this time Mr. Parker has been in John and Cliff streets for 20 years. Just at present Messrs. Anderson & Passavant are very busy filling regular orders. The bridge contract has not been allowed to interfere with the regular business. We learn that a roll on which the wire for the Brooklyn bridge was being made was broken on Saturday, and as a consequence work has been suspended temporarily.

### PENNSYLVANIA.

The Lancaster Locomotive Works are to be converted into a rolling mill by Mr. W. H. Roberts, who has recently purchased them. He will manufacture bar iron, railroad spikes, bolts, nuts, etc.

Nearly all the work in the Phoenix Iron Company's shops is now done by contract. Workmen commenced on 10 hours on the 19th.

The Lackawanna Iron and Coal Company pay their laborers 85 cents a day, working 10 hours, and \$1 for a day of 12 hours.

It is reported that the Windsor Furnace, Lenhartville, will not start this spring on account of not having charcoal enough. At present some 50 men are chopping wood.

The Paxton Mill, Harrisburg, has resumed. Hoopes & Townsend, Philadelphia, are experimenting with a pair of rolls which shape the nut after the bar is finished to the proper size, but have not yet got it to perfection.

Puddling at Philadelphia is \$4 per ton in the city, and \$3-80 at Manayunk.

The Scranton Republican says the miners in that vicinity are agitating the question of organizing against the late reduction.

All the ore mines in the neighborhood of Topton are being worked.

Of the 51 furnaces in the Lehigh Valley, only 21 are in blast.

The Star, of South Bethlehem, says: The steel rail mill resumed operations last week. The Bessemer Steel Works have resumed, the break having been repaired. The steel mill is now running on narrow gauge rails. The company have a 1500 ton order from the Baltimore and Chesapeake Road, and a 6000 ton order from the Lehigh Valley Road. The mill will turn out over 200 tons of 66 pound rails every 24 hours.

Thirteen thousand dollars were paid by the Brooke Brothers, iron manufacturers, at Birdsboro', Berks county, during the month of February for wages to workmen. Last week the firm shipped 4000 kegs of nails to New York alone.

The Oley Charcoal Furnace will remain in full blast until about the middle of April, when by that time their stock of coal will be consumed.

The Stearns Manufacturing Company, Erie, seem to be feeling the benefit of the Centennial in their foreign orders. They have just received an order for a sawmill complete from Coleraine, Ireland. Their mills, beside a general reputation here, seem to be gaining in favor abroad. This firm are building large numbers of boilers and engines for the oil regions, their shipments in this line amounting to two per day. They are at present running full time, and working at night as well.

### PITTSBURGH AND VICINITY.

No. 2 stack of the Isabella Furnace banked up on the 15th instant on account of running short of ore. Both stacks have been in blast some time, and have run the stock pile quite low, and No. 2 has been banked to await the opening of navigation.

The Eberhard Mfg. Co. are two months behind their orders, running mostly on their patent hames and harness buckles.

It has often been a subject of wonder that with its extensive window glass industry, Pittsburgh has no plate glass manufactory. The only reason why it is so, is only because it is so. There is no good reason why plate glass cannot be manufactured here just as well and as cheaply as it is west of this place. At least, it is a subject that Pittsburgh capitalists should examine.

Miller, Metcalf & Parkin are running their works (steel) night and day. They are far behind their orders on their sheet mill, and are about to build a new train. Five pair of cold rolls are running night and day, cold rolling steel for corset stay, clock spring, mild steel for stamping, &c. Their 9 inch train is doing most excellent work, rolling 90 lb. billets to 1 in. by ½ at one heat.

The Pittsburgh Steel Casting Co. are using gas from the Siemens producers under their boilers. This is, so far as we know, the first instance of the kind.

Work on No. 2 stack at the Lucy Furnace is progressing rapidly, and it will be ready to blow in August.

Hussey, Blinn & Co. are making on an average 45 dozen shovels per day.

The Edgar Thomson Steel Works have just closed a contract with the New York Central Railroad for 2000 tons rails, and with the Lake Shore for 1500 tons, all for April and May delivery. The steel rails used by these roads heretofore have been mainly of English make, and it is much to the credit of these works that with several others nearer they have bought of them.

Zug & Co. have stopped their mill in all departments, and will remain idle for the present, or until prices are better.

Maj. Knap has retired from the management of the Charlotte Furnace, Scottdale, and also from the firm of Everson, Knap & Co.

The demand for blue glass is dying out. Would it not be well to put the demand itself under blue glass?

### WEST VIRGINIA.

The Benwood Mill, Wheeling, is now running 105 machines, under the new manager of the mill department, Mr. Luke Aitmyer, late of the Belmont.

The Riverside Mill, Wheeling, has 36 furnaces.

### OHIO.

In reference to the furnaces near the Portsmouth branch, a correspondent of the Greenup Independent says: Nothing new or encouraging in the immediate future in the iron market. Furnacemen are very blue over the present outlook, and many of them unsettled as to their future course. The furnaces on our road are all out of blast except Fulton, and most of them sold up close on iron, and especially on the better grades of mill. Madison, Jefferson, Buckeye, Star, Fulton and Hamden are carrying some 12,000 to 15,000 tons, mostly No. 1 foundry. Scioto, Monroe, Jefferson, Madison, Buckeye, Keystone, Hamden and Lincoln are chopping wood for about a 2000 tons blast each. Mr. Cobb talks of running Latrobe on a small blast. She was entirely out last year. Gallia has decided not to run. Ste is not cutting wood, but will still take in ore for future use. Washington will take in ore and still try farther on stonecoal. It is hoped she will make a success out of her experiments in that direction. Huron, Star, Orange and Milton (all stonecoal) have sufficient stock to start any time they may see fit to do so. Tropic and the Wellston furnaces have no ore on hand.

Bellefont has about completed chopping wood, having now on hand 10,000 cords. A new stone inwall is now being put in; the last one made of brick not having lasted longer than three years. She will go in blast on the 1st or 15th of May.

About 300 men employed at the Old Mill of the Cleveland Rolling Mill Company, struck on Monday of last week, in consequence of having received notification that their wages were to be reduced. There has been no collision as yet, nor has the difficulty affected the other mills, although persons concerned state that it undoubtedly will result in a general strike. The officers of the Rolling Mill Company decline to give any information in reference to the matter.

Gaylord's Mill, Portsmouth, proposes to put up some additional boiling furnaces so as not to run double turn, so it is reported. This is somewhat different from the usual practice, as it is thought best to run double turn when the mill runs at all.

Himrod Furnace was damped down Sunday night to enable the managers to repair the blast pipe and clean out flues. The large blast engine that was broken up so badly on December 23d has been repaired, and will be put in operation shortly.

Mr. Witherow has let the contract for building the new Shawnee Furnace to Lambert & Gordon, Ironton. It will have three Whitwell hot-blasts.

Pine Grove Furnace is to put in new Player hot-blasts.

The capacity of the works of Hotchkiss & Gaylord, Cleveland, is equal to the production of from 25,000 to 30,000 finished bolts and 3000 pounds of screws per day.

The Butchers' and Packers' Supply Company, of Cincinnati, have recently issued a large and handsomely illustrated catalogue of the great variety of butchers' and packers' tools and supplies which they manufacture. This is the only manufacturing establishment of this class of goods in the West. Their agent has recently returned from a trip South and reports a fair list of orders.

### ILLINOIS.

The firm of Buchanan & Bruce, Chicago, manufacturers of wagon and carriage springs, has dissolved, the business being continued by Mr. R. S. Buchanan.

It is claimed that 15,000 tons of merchant iron are consumed annually in the cities of Moline, Rock Island and Davenport. In view of this fact, parties propose establishing a rolling mill in one of these cities.

The Moline Plow Co. was founded in 1864, on a capital of \$20,000, with a force of twenty-five hands, turning out only 1000 plows per annum. The business grew rapidly, and constant additions to the producing capacities had to be made to keep up with the increasing demand for the implements turned out. The company was incorporated in April, 1870, with a paid-up capital of \$400,000. The officers are R. K. Swan, president; G. O. Stephens, vice-president; C. W. Lobdell, secretary; A. S. Carson, treasurer. In 1876 the capital had been increased to \$600,000, the number of employees to 400, and the product to 50,000 plows, amounting to over \$1,000,000. The works occupy about two acres of ground, and including the several floors, from five to eight acres.—Western Manufacturer.

The Deere & Co. Plow Works, Moline, have the reputation of being the largest establishment of the kind in the world. They employ over 600 hands, and the works have a capacity of 500 steel plows, cultivators, sulky and gang plows every working day in the year, making a grand aggregate of 150,000 implements. John Deere, the founder of these mammoth works, was a pioneer steel plow maker in the Northwest, having established the Grand Detour Plow Works, Lee county, in 1833, whence ten years later he removed to Moline and founded the present establishment. At this time the "Deere plow" is known in all parts of the world, having been shipped quite largely to Russia, Australia, South America and Cuba.

The Illinois glass houses are making blue glass. Rock Island has eight pots running on this "cerulean fragility."

The Joliet Iron and Steel Company's mills have been leased for five years by A. B. Meeker & Co., who agree to pay all taxes, the interest on all indebtedness, and \$150,000 a year rental. The works will be in full operation in a few months.

### KENTUCKY.

The Lithgow Mfg. Co., of Louisville, built last year a large addition to their extensive stove and iron mantle establishment. They are now running their works full, with large orders ahead and fair prospects for the approaching season.

One of our foremost ironmasters informs us that at one of our Kentucky charcoal furnaces a number of laborers have supported their families during the last four months at the rate of from \$12 to \$14 per month. This fact proves that economy has largely gained ground among our laboring classes, and that if a like tendency is faithfully and steadily observed in the future, there will be a time of modest independence in the reach of even the poorest.—Greenup Independent.

The Ashland Furnace contemplate erecting Whitwell hot-blasts.

All departments of the Norton Iron Works are running full time.

The Kentucky Rolling Mill, at Louisville, is running full, single turn. On their 12 inch mill they are making 40 lb. rails. They are about filling an order for 60 tons of 40 lb. rails, and have another large order for rails of same weight. This mill is now making, on an average, 140 tons of rails and merchant bar per week.

Messrs. Crutcher & Martin, of Louisville, proprietors of the Louisville Iron Works, are running their works full, single turn. They make iron railing and jail work a specialty. They also manufacture machine, plow, carriage, bridge and railroad bolts of all sizes, and coach and lag screws, washers, miners' and railroad picks and sledges.

### MICHIGAN.

We clip the following Michigan items from the Marquette Mining Journal of the 17th: The Menominee Furnace fires were lighted again last Monday. The Deperre Furnace was blown out last week, after a run of nearly 12 months, during which she made only a little less than 10,000 tons of iron. This, the Menominee Herald says, "is far ahead of any work ever before done by a charcoal furnace." We think the Herald is mistaken. The Bay Furnace made in a blast extending over a period of 320 days, 9695 gross tons, which is, we think, the best work yet accomplished, though the Bangor Furnace claims to have done better. Masons are at work repairing the Rolling Mill stack, and getting everything in readiness for blowing in as soon as fuel can be obtained. The hot-blast is being torn down and the old

pipes taken out and replaced with new. The blowing engine, after the long run of the furnace, was found to be in need of a few repairs. The lining of the stack was found to be in good condition, but of the hearth nothing can be determined until the return of the founder, who is at present away on a visit.

### WISCONSIN.

The Racine Silver Plate Company is a joint stock association, with a paid-up capital of \$35,000. The officers are J. H. Kelly, president; B. F. Weeks, secretary and treasurer; S. P. Hart, superintendent. Some 40 hands are employed, and the value of annual products \$50,000. This company turn out very superior ware, made of extra durable white metal and heavily plated. In beauty and variety of design and high finish the wares of the Racine Silver Plate Company will compare favorably with that of any establishment in the country, east or west.

The Milwaukee File Works, in which seven hands are employed, have been in operation about 12 years.

### INDIANA.

The Variety Foundry Company was organized last September, at New Albany, as a co-operative stock company. They manufacture steam engines, mill machinery, grate bars, lining fire fronts, spar and gear wheels, pulleys, &c.

The rail mill, at New Albany, is running lively, with full set of hands, single turn.

The Ohio Fall Iron Works have been running full, single turn, since January 20. These works recently filled an order for a lot of bar iron 4 inches wide by 45 feet in length. Their prospects are fair for spring trade.

In Glashulte, Saxony, a manufacturer employs an aluminum in the production of watch springs. The new springs have the advantage over the old in not being subject to rust, in not being magnetic, and in possessing greater hardness and elasticity.

During the past year the German press issued 848 works devoted to the natural sciences, 296 to geography and travel and 190 to mathematics and astronomy.

## The Coal Market.

### Anthracite.

PRICES FOR MARCH.

	Lump.	Steamer.	Broken.	Egg.	Stove.	Chick.
PENNSYLVANIA COAL CO., at New York, 40 cents per ton additional. Deliverable at Weehawken.						
Pittston.....	3 10 3 10 3 10 3 10 3 10 3 10	3 25 3 25 3 25 3 25 3 25 3 25				
" Auction prices. 2 97 2 92 2 95 2 98 3 48 3 26						

DELAWARE AND HUDSON CANAL CO., at Weehawken, N. J.						
Lackawanna.....	2 95 2 95 2 95 3 00 3 60 3 32					

LEHIGH AND WILKES-BARRE COAL CO., f.o.b. at Port Johnson, N. J.						
Old Company's Summit.....	3 75	3 25 3 25 3 65 3 25				
Honey-Brook Lehigh.....	3 75	3 25 3 25 3 65 3 25				
Wilkes-Barre.....	3 00 3 00 3 00 3 10 3 65 3 25					
Plymouth Red Ash.....	3 00 3 10 3 75 3 35					

FREDERICK A. POTTS, 110 Broadway, New York.—Port Johnson, Elizabethport and Hoboken.						
L. & W. C. Co.'s Wilkes-Barre.....	3 00 3 00 3 00 3 10 3 65 3 25					
L. & W. C. Co.'s, Old Co. Lehigh.....	3 75	3 25 3 25 3 65 3 25				
L. & W. C. Co.'s, Plymouth Red Ash.....	3 00 3 10 3 75 3 35					
L. & W. C. Co.'s, Honey-Brook Lehigh.....	3 75	3 25 3 25 3 65 3 25				
Scranton.....	3 00 3 00 3 00 3 10 3 65 3 25					
Lackawanna.....	2 95 2 95 2 95 3 00 3 60 3 32					

WHITNEY, McCREARY & KEMMERER, 111 Broadway, New York.—John White, Sales Agent.—F.o.b. at Elizabethport or South Amboy.						
Upper Lehigh and Council Ridge.....	3 75	3 25 3 25 3 65 3 35				
Everhardt Wyoming.....	3 75	3 25 3 25 3 65 3 35				
Wilkes-Barre.....	3 00 3 00 3 00 3 10 3 65 3 25					
Shamokin.....	3 75	3 25 3 25 3 65 3 35				
East Spring Mountain Lehigh.....	3 75	3 25 3 25 3 65 3 35				

A. S. SWORDS, 111 Broadway, Pittston, at Newburg.....	2 85 2 85 2 85 2 95 3 50 3 25					
Lackawanna, at Rondout.....	2 95 2 95 2 95 3 00 3 60 3 32					
Fulton Lehigh, at S. Amboy.....	3 75	3 25 3 25 3 65 3 35				

G. B. LINDENMAN & CO., No. 111 Broadway, Sugar Loaf, (Lehigh).....	3 75	3 25 3 25 3 65 3 35				
Wilkes-Barre.....	3 00 3 00 3 00 3 10 3 65 3 25					
Wyoming.....	3 75	3 25 3 25 3 65 3 35				

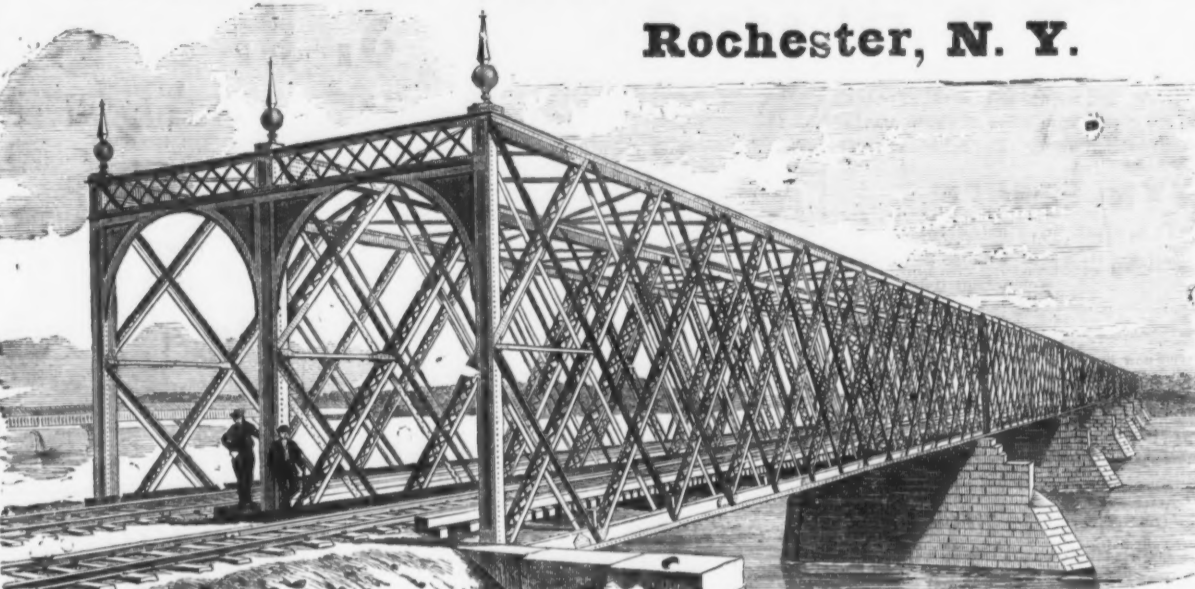
NEEKER & DEAN, 111 Broadway, Lackawanna Valley.....	2 85 2 85 2 90 3 00 3 60 3 25					
Kingston, Wm'g White Ash.....	2 85 2 85 2 90 3 00 3 60 3 25					
Chaucery Wyoming Red Ash.....	3 75	3 25 3 25 3 65 3 35				
Wilkes-Barre.....	2 85 2 85 2 90 3 00 3 60 3 25					
Beaver Brook Lehigh.....	3 75	3 25 3 25 3 65 3 35				

LEHIGH VALLEY COAL CO., corner Courtlandt and Church streets.—F. o. b. at Perth Amboy.						
Spring Mountain Lehigh.....	3 75	3 25	3 25	3 65	3 35	
Spring Brook Lehigh.....	3 75	3 25	3 25	3 65	3 35	
Jeddo Lehigh.....	3 75	3 25	3 25	3 65	3 35	
Highland Lehigh.....	3 75	3 25	3 25	3 65	3 35	
Phila. Coal Co.'s Lehigh.....	3 00	3 00	3 10	3 10	3 65	3 35
Wyoming.....		3 00	3 10	3 30	3 65	3 35
Franklin (Wilkesbarre).....		3 00	3 10	3 30	3 65	3 35
Centralia.....	3 00	3 00	3 10	3 30	3 65	3 35

**TACKS, LINING, AND SADDLE NAILS**  
 AMERICAN TACK CO. Factory at Fairhaven, Mass. N. Y. Salesroom, 117 Chambers Street.  
 COMMON, CHISEL POINTED, AND COPPER BOAT NAILS. ANY SIZE OR STYLE OF TACK OR NAIL MADE FROM SAMPLE TO ORDER.

**NATIONAL Horse Nail Co.**  
 MANUFACTURERS OF  
**FINISHED**  
 (BRIGHT OR BLUED)  
  
 These nails are made of the best brands of **NORWAY IRON**, and are guaranteed to be equal to any in the market.  
**NATIONAL HORSE NAIL CO.,**  
 VERGENNES, VT.  
 HORACE DURRIE & CO., Agents,  
 No. 97 Chambers St., New York.

**LEIGHTON BRIDGE AND IRON WORKS,**  
 Rochester, N. Y.  
 Wrought Iron Riveted Lattice Railroad AND HIGHWAY BRIDGES.  
 Wrought Iron WATER PIPE.  
 The most economical and durable Pipe manufactured for Water Works, Oil Lines or Gas Mains.  
**General Riveted Work**  
 Orders Solicited from Civil Engineers and Contractors.  
 [Accompanying engraving represents the Springfield Bridge, built by the Leighton Bridge and Iron Works.]



**L. COES' Genuine Improved Patent SCREW WRENCHES.**  
 Manufactured by **L. COES & CO.,** Worcester, Mass.  
 Established in 1838.  

  
 We invite the particular attention of the trade to our New Straight Bar Wrench, widened, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to any strain the bar may be subjected to.  
 These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.  
 We would also call attention to the fact, that in 1869 we made several important improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes which were at once closely imitated and sold as the Genuine Wrench by certain parties who seem to rely upon our improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be good evidence that we manufacture a superior Wrench, we wish the trade may not be deceived on the question of originality. Trusting the trade will fully appreciate our recent efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped  
**L. COES & CO."**

Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.  
**HORACE DURRIE & CO.,** Sole Agents.

**M. H. JONES & CO.**  
 BEST CUT-STEEL AXES  
 AND EDGE TOOLS.  
 Agents, New York.



**THE AMERICAN WIRE NAIL CO.,**  
 Manufacturers of  
 Molding, Trimming, Upholstering & Finishing Nails,  
 Escutcheon Pins and Wire Nails  
 Of all kinds and sizes, with Flat, Oval, Depressed, or Countersunk Heads, with or without point.  
 Warranted Well Made and of Superior Quality.  
 Lock Box 853. OFFICE AND WORKS, Covington, Ky.

**WOOD'S PATENT ADJUSTABLE HOLLOW AUGUR.**  
 The knife has an independent lip, and only requires resetting when sharpened. The jaws of this Augur are Steel Castings. The knife and adjusting bolt and nut are forged from the best refined Cast Steel.  
 The difficulty heretofore experienced of cutting any and every size, in order to accommodate variation in bits, is entirely overcome in this Augur.  
 The scales are laid off in sixteenths, from 1/4 to 1 1/2 inches, and are perfectly accurate when the knife is set so that the tenon will fill the jaws, which, having three bearings, will always make the tenon round and perfect. To cut any variation from the sixteenth, it is only necessary to make an allowance on the scales as it would be done on a rule. In repairing, to duplicate a tenon, close the Augur jaws on the old one and it will cut the new one the same size.  
 These Augurs have been thoroughly tested. The parts are perfectly duplicated, and the material and workmanship are guaranteed.  
 We offer this as the latest improved and best Hollow Augur in market. It will surely take the preference until something better is invented.  
**PRICE, \$4 each.**  
**MILLERS FALLS COMPANY,**  
 No. 74 Chambers Street, NEW YORK.



**HOWARD PARALLEL BENCH VISE.**  
 MANUFACTURED BY **Howard Iron Works,** Buffalo, N. Y.  
 Send for price list.  
 RUSSELL & ERWIN MFG. CO. New York & PHILADELPHIA AGENTS.



**THE EAGLE ANVIL!! WARRANTED!!**  
 (ESTABLISHED 1843.)  
 These Anvils are superior to the best English, or other Anvils, on account of the peculiar process of their manufacture (invented and used only by this concern), and from the quality of the materials employed.  
 The best English Anvils become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.  
 The body of the Eagle Anvil is of crystallized iron, and no settling can ever occur; the steel face, therefore, remains perfectly true. Also, it has the great advantage that being of a more solid material, and consequently with less rebound, the piece forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as of a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a hammer one-fifth lighter than that required when using a wrought iron anvil.  
 The working surface is in one piece of JESPER'S BEST TOOL CAST STEEL, which, being accurately ground, is hardened and given the proper temper for the heaviest work. The horn is covered with and its extremity made entirely of steel.  
 The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is warranted to be thoroughly welded and not to come off.  
 Price List, October 1st, 1876. ANVILS weighing 100 lbs. to 800 lbs. per lb.  
 Smaller Anvils, ("Minims")  
 No. (0) 0 1 2 3 4 5 6 7 8 9  
 Weighing about 5 lb. 10 lb. 15 lb. 20 lb. 30 lb. 40 lb. 50 lb. 60 lb. 70 lb. 80 lb. 90 lb.  
 \$2.25 \$2.75 \$3.25 \$4.00 \$4.50 \$5.25 \$6.00 \$6.75 \$7.50 \$8.25 \$9.00  
 N. B.—These are the RETAIL PRICES. The only additional cost will be the freight to the purchaser's place of residence.  
 THESE GOODS ARE SOLD BY THE GENERAL AGENTS (with special discounts to the trades.)  
 New York.—Messrs. J. CLARK WILSON & CO.—RUSSELL & ERWIN MFG. CO.—Messrs. HORACE DURRIE & CO. Boston.—Messrs. GEORGE H. GRAY & DANFORTH. Philadelphia.—Messrs. JAMES C. HAND & CO. Baltimore.—Mr. W. H. COLE. Louisville.—Messrs. W. B. BELKNAP & CO. FISHER & NORRIS, Sole Manufacturers, Trenton, N. J.



**JOHNSON'S PATENT UNIVERSAL LATHE CHUCK.**  
 We invite attention to the superior construction of this chuck. Its working parts are absolutely protected from dirt and chips. It is strong, compact and durable, and will hold the greatest variety of work, as the jaws are adjustable with a range the full diameter of the chuck. For Price List address, **Lambertville Iron Works, Lambertville, N. J.**



**THE EUREKA STEAM AND HYDRAULIC PACKING.**  
 The result of a long series of experiment made with a view of meeting all the requirements of a Perfect Packing. And we assert without any reservation that is the best article of its kind yet invented. It is made of the best materials, is elastic, pliable, and does not become hard by use, consequently is easily taken out when renewal is necessary. It is a rubber center, rectangular in form covered with a series of braids of linen, between which is placed a lubricative compound superior to anything ever before used for the purpose, and contains nothing that can in any manner cut, bite or gum the rods, no matter how long run. It has thus far received the highest praise of every Engineer who has used it, and we have received many testimonials from the proprietors of Mills, Factories, Iron Works, &c., that it is the most durable, efficient and cheapest packing they ever used. All we ask is a fair trial, knowing it will convince better than any words of ours. Orders promptly filled.  
**SYMONDS & CO.,** 120 Exchange Place, Phila., Sole Manufacturers.  
 Or WICKERSHAM & CO., Gen'l Agents, 403 Liberty St., Phila.



## The Patent Automatic Stokers

(which were shown at the Centennial Exhibition in the British section, and obtained the medal and highest awards, and the Patents for which in the United States are owned exclusively by the subscriber) are now offered for the first time to the users of steam-power in this country, with full confidence that the satisfactory results obtained in Great Britain and on the Continent of Europe (where over 1200 of them have been erected within the last few years), will be fully realized here. Some of these results are: The generation of from 25 per cent. and upward of steam from a given grate surface above what is obtained from the same quality of fuel fed by hand. The lessening of the cost of steam from 10 to 30 per cent. from being able with the Stokers to properly burn a lower priced fuel. The entire removal of the smoke nuisance. The lessening of the labor of the fireman. Their use also reduces materially the temperature of the fire room and also prevents the injury to the boiler caused by the contraction and expansion of the plates resulting from the frequent opening of the fire doors in hand firing. These and other advantages have secured their introduction into the boilers of many of the largest Mills and Iron Works in England and other countries, and we are now turning out an average of 10 machines per week. A few letters are given from some of those having them in use, the statements in which can be implicitly relied upon. For information respecting price, &c., apply to

### DILLWYN SMITH,

18 S. Sixth St., Philadelphia, Pa.

Atlas Works, Hackney, Wick, October 11, 1875.  
Having used your Mechanical Stoker for 12 months, we beg to inform you that it gives every satisfaction, and, when using good small coal, find a saving of about 15 per cent.  
BROOKS, SIMPSON & SPILLER,  
p. p., H. J. LOWE, Chief Engineer.

From Messrs. Barlow & Jones, Albert Mill.

Bolton, May 4, 1874.  
We have pleasure in informing you that after careful calculation we consider your Mechanical Stoker is saving us 12 per cent. in weight of fuel and fully 20 per cent. in cost of driving, owing to our being able to use lower priced coal. With the coal we are now using we could not possibly have driven with hand firing. We shall be most happy to recommend its apparatus to anyone you may bring or send to see it.

Account of a recent experiment of the Comparative Results of Hand and Stoker Firing.  
Barlow & Jones (Limited), Albert Mills.  
Bolton, August 31, 1875.

Messrs. JACKSON & REED.  
Dear Sirs: The amount of coal burnt in firing by hand-averages of two weeks—was 31 tons per week, against 31 tons using the Stokers. The coal used for hand firing was Best Burgundy, at 10/10; or 10s; that for

the Stoker was Slack, at 8/6. With the latter the men could not have kept steam up with hand firing.

We are, yours, truly,

For BARLOW & JONES (Limited),

J. E. BARLOW.

From the Milking Green Spinning Company (Limited).  
Lees, near Manchester, March 14, 1876.

Having now had the second boiler fitted with your "Henderson Patent Stoker," at work two months, we find it equally satisfactory as at first. Up to Christmas, when we had only one boiler working, we could not have run at all by hand firing. We were then indicating 25 horse-power, and heating the mills with a consumption of 17½ tons of coal per week, evaporating 44,000 gallons of water at 80 pounds pressure. Thus we were working under 2½ pounds per hour per indicated horse power, and evaporated 10 pounds of water to the pound of coal—most satisfactory when we consider our previous expenditure of fuel.

From the Mostyn Coal and Iron Company,  
July 22, 1874.

Four boilers working day and night, single flues. Consumption before D. Smith's Stokers were erected, 160 tons Burgundy at 8/6, 12/12; with Stoker, 145 tons Slack at 6/6, 10/10; 12/12; a saving of about 25 per cent.

ESTABLISHED 1850.

### WM. HASSALL,

Manufacturer of

American and French

### WIRE NAILS

With Flat, Depressed and Screw Heads.

SHOE NAILS of Brass and Iron.

Molding and Finishing Nails, with or without heads. Brush Makers', Upholsterers' and Undertakers' Finishing Nails specially. Brass and Iron Escutcheon Pins, with flat, round and fancy heads, all sizes on hand and to order.

OFFICE AND WORKS:

Nos. 63 & 65 Elizabeth Street, New York.



## ROBERT HARE POWEL & CO.

GENERAL OFFICES:

424 Walnut Street, Philadelphia.  
75 Trinity Building, New York.  
16 S. Water St., Providence, R. I.  
22 Central St., Boston, Mass.

Sole Proprietors, Miners & Shippers  
of the celebrated

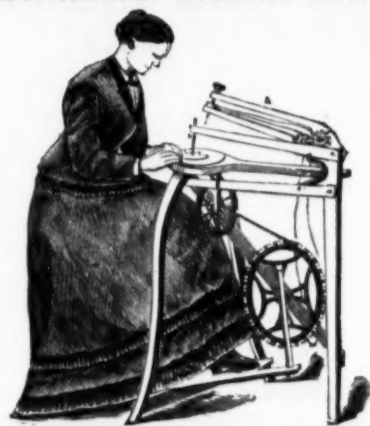
## POWELTON SEMI-BITUMINOUS COALS.

THE BEST & CHEAPEST

In the market for the use of Ocean Steamers, Tugs, Steamboats and Locomotives. Stationary Engines, Steel Mills, Rolling Mills, Puddling Furnaces, Glass Manufacturers, Blacksmithing, Brick and Lime Burning, and General Industrial Purposes.

These coals can be delivered to all points reached by railroad or navigation.

## THE IMPROVED Centennial Bracket Saw!



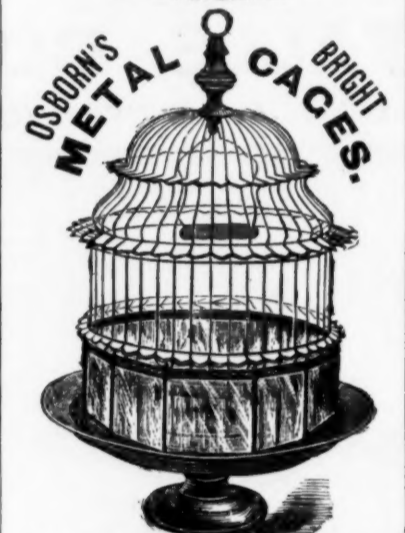
For Sawing Parlor Brackets, Mottos and Ornamental Scroll Work of every description, from the Parlor Bracket to the finest Inlaid Work. Over 800 of these saws were sold in nine months last year. Each saw is complete and ready for use, and is furnished with four saws and 25 designs. Send for our Illustrated Catalogue and Manual of Fan Wood Work. It contains over 75 new designs and is a complete manual for the amateur. Price, 15 cents. Each book is furnished with a panorama. See our illustrated advertisement—week in each month.

SHIPMAN & BINDER,  
Manufacturers and Publishers,  
111 Water St., Rochester, N. Y.

### POCKET Coin Detector.



Size of a Silver Dollar. With it and a penknife you can test any coin accurately. Price 25 cents by mail. Liberal discounts to agents.  
J. W. SUTTON,  
95 Liberty St., New York.



The Original Inventors and Manufacturers of the OSBORN BRIGHT METAL CAGES.

Also OSBORN & DRAYTON improvements under twelve different patents. We are continually bringing out new and beautiful designs to meet the demands of refinement and taste.

ALVAN DRAYTON, General Agent.

## JOHN MAXHEIMER, Manufacturer of Patented BIRD CAGES,

Japanned and two kinds of Brass. With and without solder.

247 and 249 Pearl Street, NEW YORK.

Catalogue and price list furnished on application.

## SEASONABLE GOODS.



Trade price reduced to \$2.50 per dozen. With quantity discounts as usual. Manufactured by HULL & BELDEN CO., Danbury, Ct.

## "CLIMAX" BARN DOOR HANGERS.

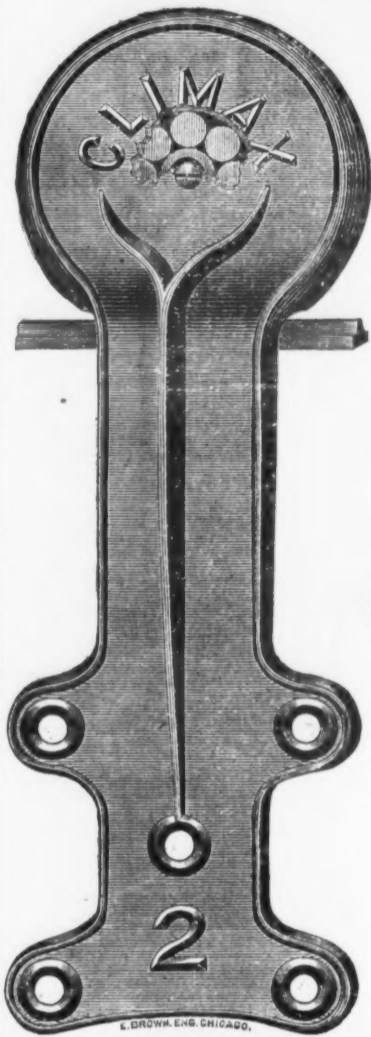
## "ACME" Barn Door Rollers.

Moore's Anti-Friction Sliding Door Sheaves.

MANUFACTURED BY

## S. H. & E. Y. MOORE,

68 Lake St., Chicago, Ill.



### PRICE LIST.

"CLIMAX" No. 1, extra large and heavy, with long strap for heavy warehouse doors, etc. Weight, 14 lbs. per pair. Packed ½ doz. pairs in a case. per doz. pairs, \$34.00  
"CLIMAX" No. 2, standard size, improved and strengthened. Weight, 8 lbs. per pair. Packed 1 doz. pairs in a case. per doz. pairs, 15.50  
"CLIMAX" No. 3, for light doors. Weight, 5½ lbs. per pair. Packed 1 doz. pairs in a case. per doz. pairs, 12.50  
"ACME" 8 inch wheel. Packed ½ doz. pairs in a case. per doz. pairs, 18.00  
"ACME" 6 inch wheel. Packed 1 doz. pairs in a case. per doz. pairs, 15.00  
MOORE'S ANTI-FRICTION SLIDING DOOR SHEAVE, 4 inch wheel. Each set packed in a paper box. ½ doz. sets in a case. per set, 3.50  
4.00  
Liberal discount to the trade.

For sale by the Hardware Trade generally.

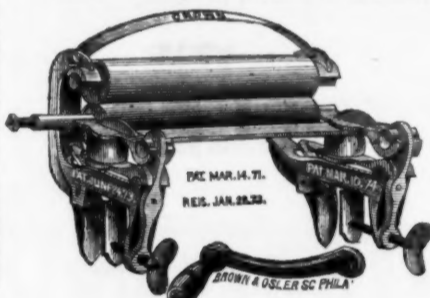
## S. H. & E. Y. MOORE,

No. 68 Lake Street, CHICAGO, ILL.

## THE AMERICAN MACHINE COMPANY, Philadelphia, Pa.,

MANUFACTURERS OF

## SPECIALTIES OF LIGHT IRON WORK.



### CROWN WRINGERS,

with Patent White Rubber Rolls, Galvanized Malleable Iron Frame Work, Resilient Steel Springs, &c. Noted for Strength, Durability, Efficiency and Simplicity.  
No. 2, Rolls 1½ in. diam., 10 in. long. No. 3½, Rolls 1½ in. diam., 12 in. long.  
No. 3, Rolls 1½ in. diam., 12 in. long. No. 4, Rolls 2 in. diam., 12 in. long.

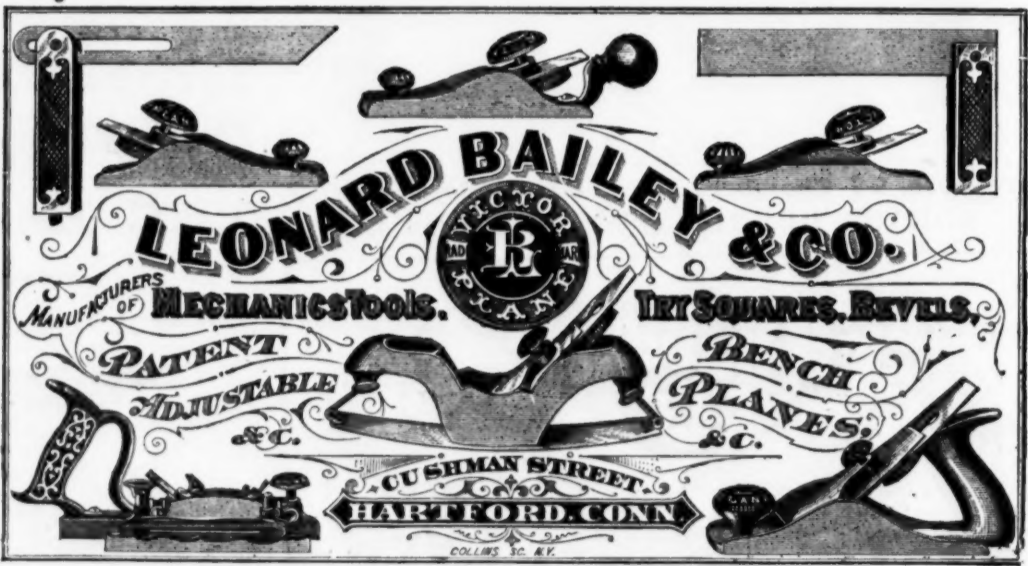


### CROWN FLUTING MACHINES,

with valuable improvements over other style Machines. Patent Spring Arrangement and Clamping Device. Noted for Superiority of Finish and Practical Advantages. The leading Machine in the market.  
Size—(length of Roll), 4½ inch, 6 inch and 8 inch.  
Rolls with 10, 12, 15, 18, 22, 26 and 30 flutes.



THE VICTOR PLANES  
Are the most simple, compact and practical Adjustable Planes ever offered to the public. They are made under the personal supervision of Mr. L. B. BAILEY, the original inventor of L. BAILEY'S PATENT ADJUSTABLE IRON PLANES. All our Planes have our Trade Mark. Send for Catalogue, embracing Planes, Try Squares, Bevels, Rules, Levels, Hammers, Miter Boxes, etc., etc.



## Wire-Drawing Machinery, Saw-Mills, Planers, &c.

MADE BY

S. HEALD & SONS, Barre, Mass.

## Shelton Company, Manufacturers of every variety of TACKS & SMALL NAILS,

Carriage, Machine, Floor, Stove and Tire Bolts, Coach Screws, Bed Screws, &c.  
BIRMINGHAM, CONN.

## W. R. OSTRANDER, Manufacturer of THE BEST IMPROVED ALARM SPEAKING TUBE WHISTLE,

Speaking Tube, Elbows and Mouthpieces. Send for new Trade List.  
SPEAKING TUBES FITTED UP.  
19 Ann Street. NEW YORK.



WM. ESTERBROOK

Wholesale Manufacturer of

## Coal Hods,

## FIRE SHOVELS, Etc.

311 Cherry St., PHILADELPHIA.

## CARRIAGE

## SPRINGS.

JOHN H. REOCK, PASSAIC SPRING WORKS, Manufacturer of Railroad Car, Locomotive, Omnibus Platforms and every variety of Carriage and Buggy Springs.  
372 to 380 Passaic St., Newark, N. J.  
Lock Box 169.

## Babcock's Sash Fastener, PATENTED JAN. 11, 1876.

Needs but to be seen to be Appreciated. Send for Circular. Sample, 30c.

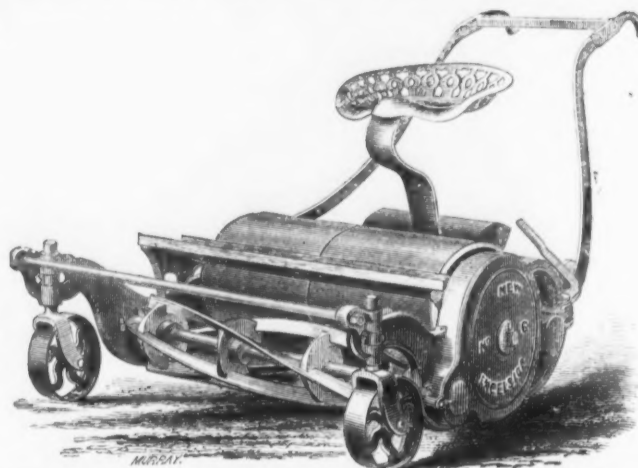
C. P. BABCOCK, Portland, Me.

Patent Rights For Sale.

Awarded the Highest Medal at the Centennial Exposition.  
**IT HAS THE LARGEST SALE OF ANY LAWN MOWER IN THE WORLD.**



**This Proves THE EXCELSIOR the best Lawn Mower in the World.**



Trade Mark  
"FOX."  
Steel Bearings.  
Scale and Weights  
Sealed. Scoop and  
Platform Weigh  
like. Sold only  
to the trade.  
**JONES,**  
of Binghamton,  
N. Y.

OS.

### The Postal Union and International Money Orders.

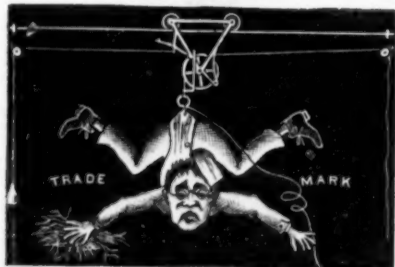
The Spanish colonies, the islands of Cuba and Porto Rico and Oceania have been admitted into the general postal union from the 1st of May prox. Brazil has been admitted, to take effect on the 1st of July next. The money order branch of the Post Office Department has had numerous complaints relative to non-payment or delays in the payment of remittances made through the international system of postal money order exchange with Germany, and tedious correspondence in tracing out remittances have been necessary in a number of cases. A recent case was as follows: A remittance was made by a gentleman in this country to an English gentleman traveling in Germany. The remittance was addressed to him in care of a distinguished Baron at Cologne. Some months subsequently correspondence disclosed the fact that the money was never paid to, or the order received by him; whereupon application was made to the American office for the return of the money. This application was forwarded to the superintendent at Washington and an inquiry made of the German Postal Department. In due time a reply came that the order had been delivered to and the money paid to the Baron at Cologne. This information was communicated to the remitter and by him to his English friend, the payee, who applied to the Baron, and was informed that he had neither seen nor heard of the order or the money. This information came back through the individual correspondents to the Money Order Office here, and fresh inquiries were made of the German office, and this additional information transmitted, when the facts came to light, which were, that the Baron was absent from Cologne when the letter containing the order was received; that his steward had appropriated the order and drawn the money for his own use. This led to other inquiries as to the German system of delivery, to which a reply has just been received, and of which the following is an extract:

"According to our instructions with regard to money orders addressed as follows: 'To A, care of B,' the last named party—viz., B—is to be recognized as the true payee. The amount of the same will be, therefore, without further delay, paid to the second named party, and the Postal Department takes no further measures to discover the first named party."

This being precisely the reverse of the rule adopted by our own Postal Department, accounts, doubtless, for many of the supposed failures in transmission of money orders on Germany, and is so radically at variance with the plan of payments in all other countries that a circular will be prepared and sent to all money order offices in the United States, directing them to notify persons making remittances by money orders to Germany of this rule of the German service, and cautioning them against sending money to the care of persons other than those they design should receive it.

An announcement of interest to the leather trade is made from Berlin. It is to the effect that an international exhibition of the whole leather industry and the production of oak bark will be held in that city in September, 1877. The Exercier Haus, on one of the busiest streets of Berlin, has been placed at the disposal of the trade by the military authorities, and there is space and steam-power enough for all the needs of the fair. The Central Association of the German Leather Trade have issued a circular inviting the world to participate. They say: "It is evident to everybody that the principal features of an exhibition ought to be utility and improvement of the industry. The honor is a secondary question. The most important thing for the exhibitors generally should be not to receive medals or any other more or less deserved distinction, but to get a true and veritable knowledge of their own industry and of the state of the competition, to look about the many places where they can sell their own goods, and wherefrom they can get the best and cheapest materials. Is all that possible in a universal exhibition? Everyone who has paid a visit at the great exhibitions of London, Paris, Vienna, Philadelphia, &c., could say that it was not only impossible to get in a useful connection with the exhibitors of the goods, for which he may have had any interest, but that it was also very difficult in respect to noise, to distractions of every kind, to resume his own thoughts in any profitable way. A general view of a special industry was not to be obtained, and the fabricant went away without having realized any profit." The American leather traders have reason to remember with pleasure all the European exhibitions at which they have appeared, and the present enterprise is one which will commend itself to their favor. Exhibitors should address the "Bureau des Central-Verbandes der Deutschen Leder-Industriellen, Friedrichs-strasse, No. 243, Berlin, S. W."

### FITZHUGH'S Elevating and Conveying Machine.



For raising any weight and depositing the same in any desired place. Furnished to the wholesale hardware trade only by the patentee and sole manufacturer  
**J. R. FITZHUGH,**  
 4225 Market St., Philadelphia.  
 Agents wanted in every State. Send for illustrated circular and price list.

## AMERICAN SCREW CO.,

Providence, R. I.

Manufacturers of

## IMPROVED Gimlet Pointed Wood Screws, Patented May 30, 1876.



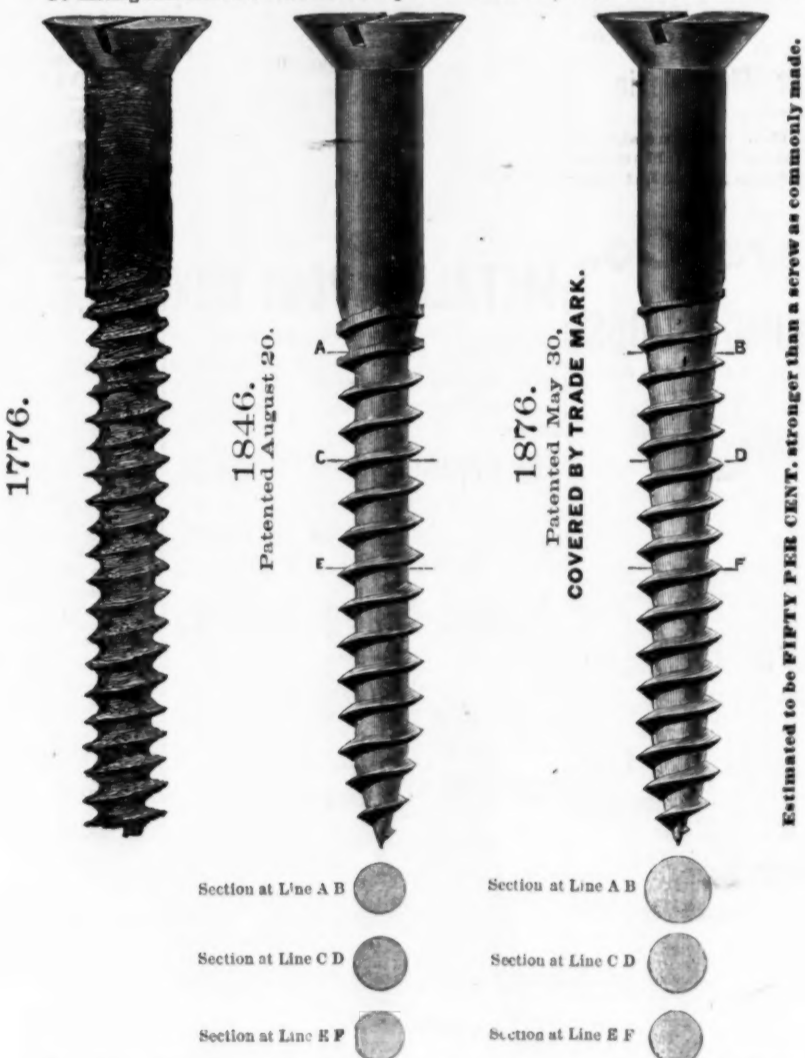
TRADE MARK

After forty years' experience we offer to the trade our Centennial Screw, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at same price as the old style screw.

The new screws will be packed in manila colored boxes with new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade mark, which is also secured to us.



Estimated to be FIFTY PER CENT. stronger than a screw as commonly made.

The above drawings show the progress of screw making from the old blunt point to style now adopted.

Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated above. See sections at lines.

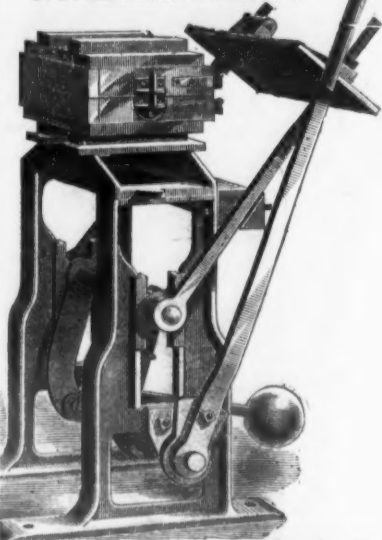
### CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

### MOLDING MACHINE.

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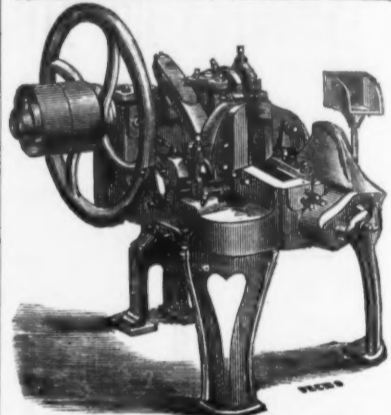
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 Metal Reporter of "The Iron Age,"  
 Box 2506, P. O., New York.

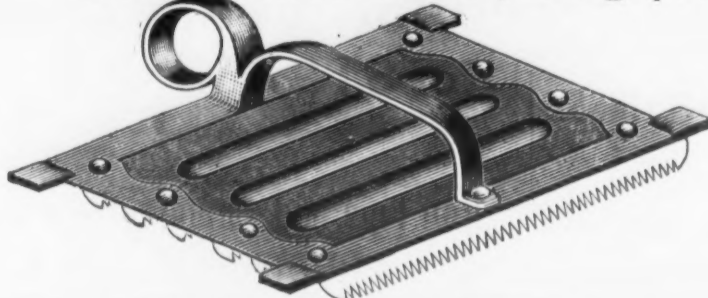
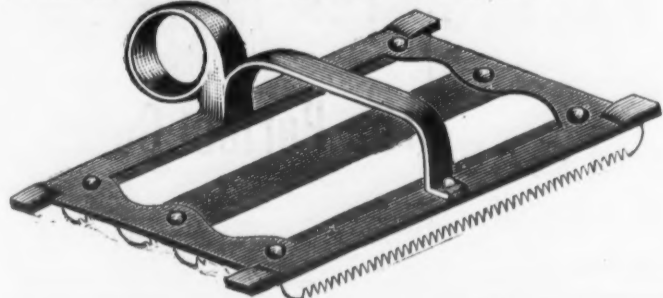
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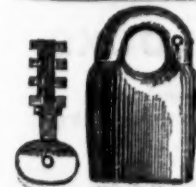
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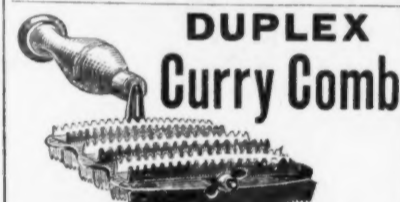
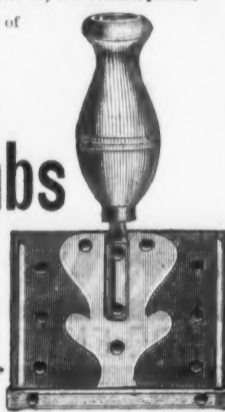
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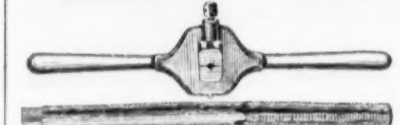
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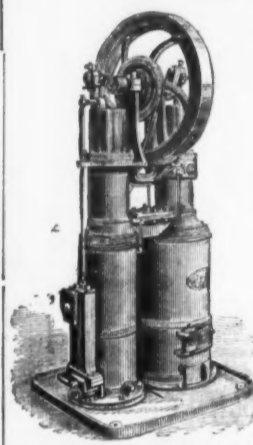
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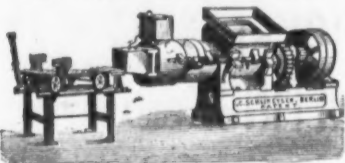
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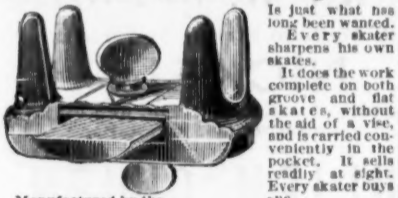
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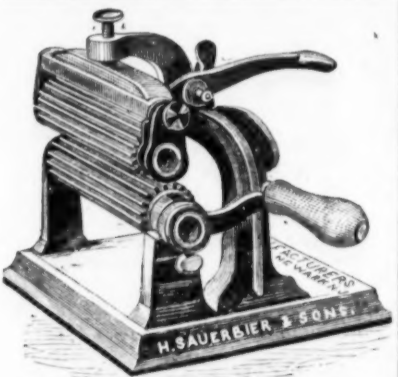


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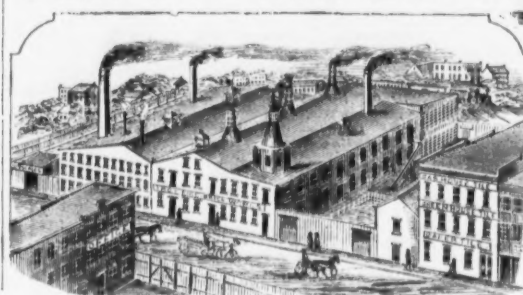
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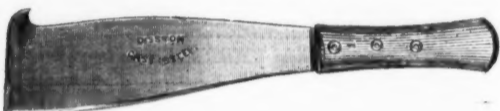
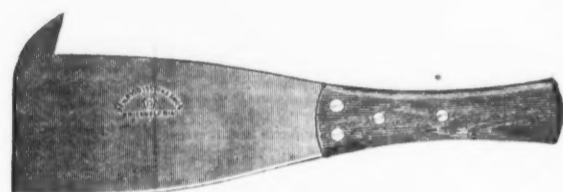
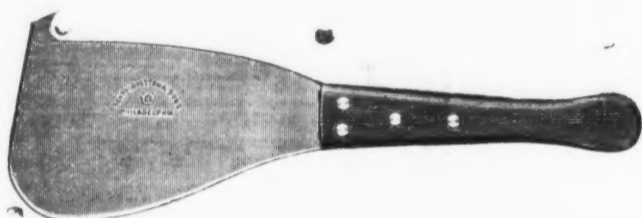
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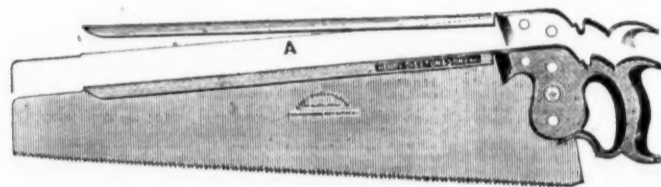
Key-Hole Saw and Pad.



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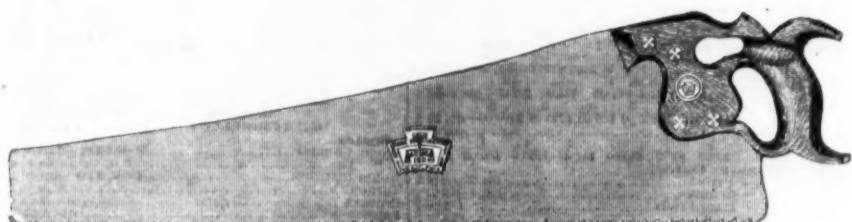
Improved Try Square.



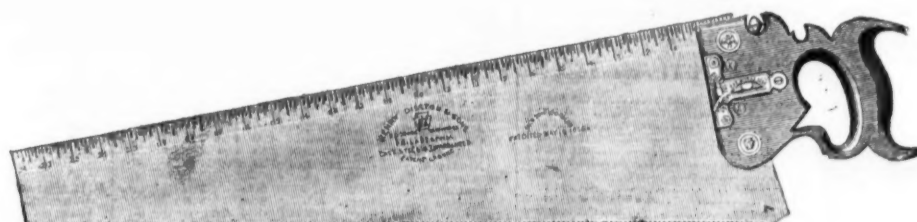
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Rosewood Bevels, 6 to 14 inch.



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15 x 36	to 24 x 30	12.25	10.75	9.00	
20 x 36	to 24 x 30	13.00	12.50	11.75	
26 x 36	to 26 x 41	14.50	13.25	10.75	
38 x 46	to 31 x 50	19.00	14.00	11.25	
40 x 51	to 31 x 50	16.00	14.50	12.00	
40 x 56	to 34 x 56	17.25	15.50	13.50	
41 x 58	to 34 x 50	18.25	17.25	15.00	
46 x 60	to 40 x 60	23.75	17.75	17.50	

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SIZES.		1st.	2d.	3d.	4th.
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11 x 14	to 16 x 25	18.75	17.50	16.75	15.50
13 x 22	to 20 x 30	17.25	15.75	14.50	
15 x 36	to 24 x 30	19.75	17.25	14.50	
20 x 36	to 24 x 30	21.00	18.50	15.75	
26 x 36	to 26 x 41	22.25	20.25	17.25	
26 x 46	to 30 x 50	24.00	22.50	19.00	
31 x 52	to 34 x 51	25.75	22.25	19.25	
40 x 56	to 34 x 56	27.25	25.00	21.75	
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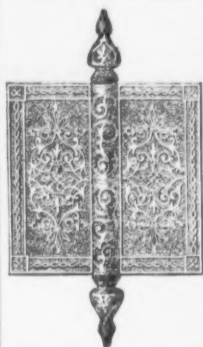
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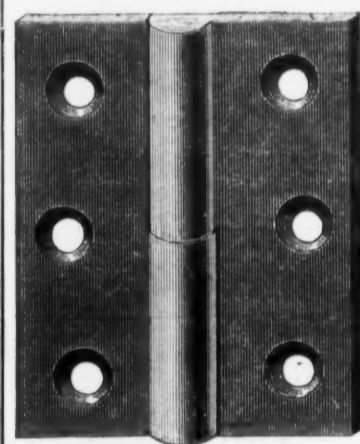
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Particular attention paid to goods for export.

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The Famous Improved  
**SHEPARDSON LOCKS**  
Are the "Best" in the World.

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ESTABLISHED IN 1862.

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We offer our Finished Nail to the trade with the  
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## Pointed Polished & Finished Horse Shoe Nails.

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All nails made from best NORWAY IRON, and warranted perfect and  
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quality guaranteed.  
Our stone are of good keen  
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"We say it is the best Wheel we ever used. If  
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BUTCHERS' MACHINES.

Choppers, Hand and Power,

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Warranted thoroughly made

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Hardware, Cutlery, &c.**

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HILLS and HORSE RASPS,

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**CHALLENGE  
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PATENTED

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"BEAVER"

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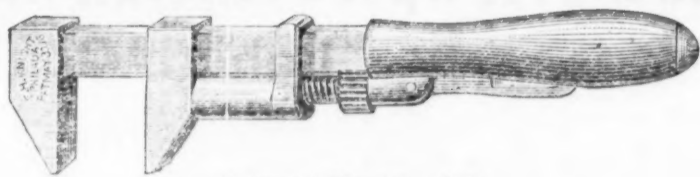
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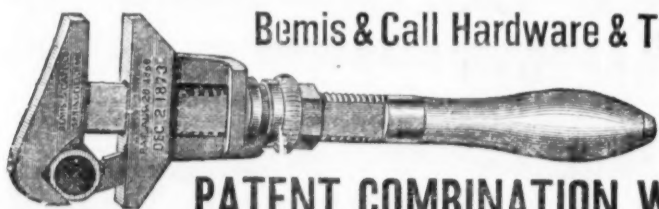
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First Premium awarded at the Centennial Exhibition.

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Bemis &amp; Call Hardware &amp; Tool Co.

**PATENT COMBINATION WRENCH.**

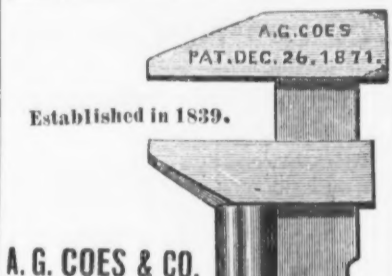
These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, Case-hardened  
throughout, and not only combine all of the superior qualities of our cylinder or Gas Pipe Wrenches, but  
also all requisite combinations of a regular Nut Wrench, thus making a Combination which has no equal.  
For Circulars and Price List, address,

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**METALLIC SIEVES.**

Protected by 14 patents.  
MANN'S PATENT.  
Best Sieve known, Cheap, Neat and Durable.  
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WORCESTER,

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Manufacturers of

THE GENUINE

COES'

**SCREW WRENCHES.**

Our goods have been very  
much improved recently, by  
making the *Bar WRENCH*, as  
shown in the cut, which makes  
a 12 in. Wrench as strong as a  
15 in. made in the ordinary way,  
and by using

A. G. COES'

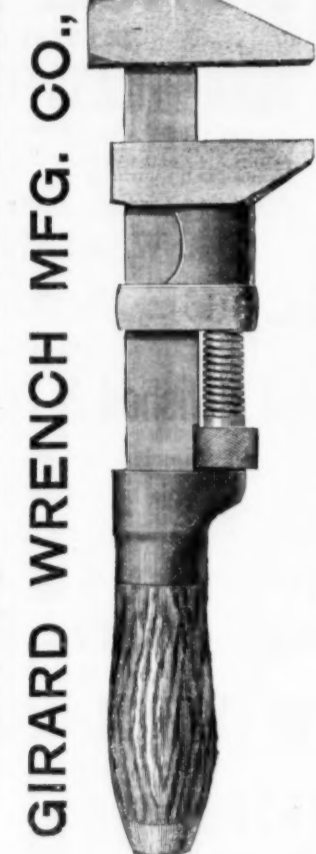
NEW PATENT

**FERRULE**

Which cannot be forced back  
into the handle.  
Our goods are manufac-  
tured under Patents dated Feb-  
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26, 1871, and any violation of  
either will be vigorously pro-  
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We call particular attention to  
our new Patent Ferrule, with its  
Supporting Nut (shown in section  
in the above cut), which makes  
the strongest Ferrule fastening  
known.

A. G. COES &amp; CO.

**Girard Wrench.**

GIRARD WRENCH MFG. CO.

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This Wrench is presented to the trade with full  
confidence that it is equal in all respects to any  
heretofore manufactured, and we fully guarantee  
our goods in every respect.  
Send for circular, terms and prices.

**Lloyd, Supplee & Walton,  
HARDWARE FACTORS.**

MANUFACTURERS OF

**Bonney's Hollow  
AUGERS.**

Stearn's Hollow Augers  
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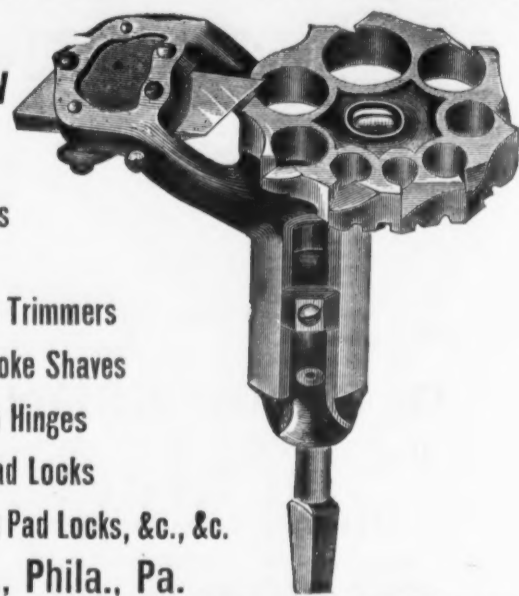
Double Edge Spoke Shaves

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**"FELTER'S PATENT LOCKS,"**

MANUFACTURED BY

**The American Lock Mfg. Co.,**

Are the most SECURE and DURABLE ever made.

SECURE

Because they have 40 Brass Tumblers, independent in their action, either one of which will prevent the  
Lock from being opened unless brought to proper position by the Key.

DURABLE

Because we use no Springs to break or get out of place

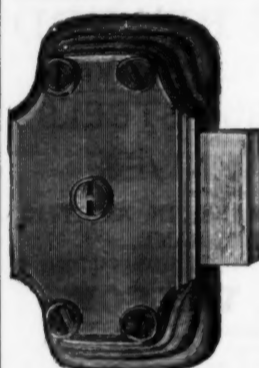
THEY HAVE

STERLING METAL KEYS

That will not corrode or wear, and are  
stronger than steel.



FULL SIZE OF KEY.



Upright Rim Dead Locks,  
Horizontal Rim Night Latches,  
Horizontal Rim Tubular Night Latches,  
Mortise Night Latches, Plain Fronts,  
Mortise Night Latches, Ornamental Bronze  
Fronts and Knobs,  
Brass Chest, Box, Cupboard and  
Drawer Locks,  
Solid Bronze Padlocks.

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All orders should be addressed  
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UNION NUT CO., General Agents, 99 Chambers St., N. Y.  
**V. G. HUNDLEY.**  
79 Reade Street, New York.

**North Carolina Handle Co.,**

Manufacturers of

SPOKES, AXE, PICK, SLEDGE, HAMMER, HATCHET and other HANDLES.  
Full assortment always on hand.

**GREENFIELD TOOL CO.,**

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Sole Manufacturers of the Celebrated

"Diamond" PLANE IRONS

EXTRA PLATED TABLE CUTLERY. PATENT FORGED OX SHOES. The only Shoe  
made with concavity to fit hoof. BENCH AND MOULDING PLANES of every description, &c., &c.  
Drop Forgings to order. Address for Catalogue with stamp.

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MANUFACTURERS OF

**SOLID BOX VISES.**

With or without Convex and Concave Washers.

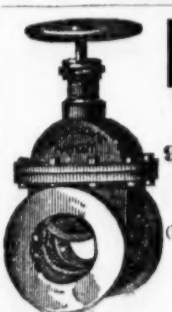


Jack-screws, Braces, Coffee Mills, Turning Lathes; Clamp  
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House Pullies, Composition Cocks, Bench Screws, Vice Screws,  
Gridirons, Drill Stocks and Rows, Box Chisels, Rivets,  
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Hardware.

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**VALVES**

(Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c.)  
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

Importers of **ALCO** New York City.

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ST. LOUIS STAMPING CO.,

# GRANITE IRON WARE

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All Goods Marked  
FOR SALE

Granite Iron Ware.  
EVERYWHERE.

**GRANITE IRON WARE IS THE ONLY SUITABLE HOUSEHOLD WARE MADE.**  
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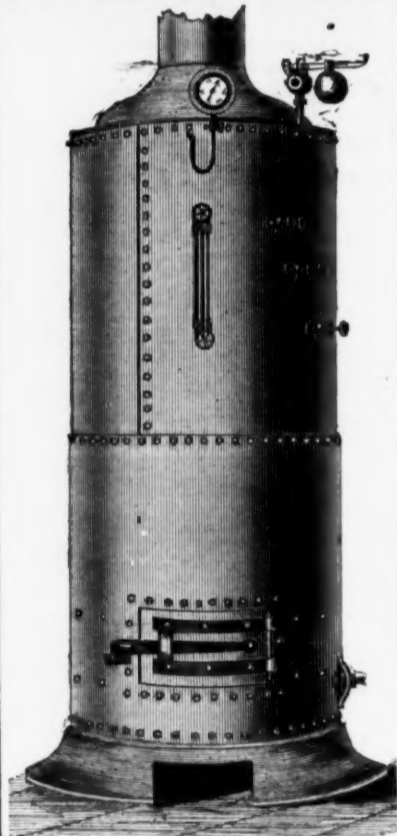
THE  
**Green River  
TIRE UPSETTER.**

PRICE, \$20.00.

Will work equally well on the  
lightest Steel Tire and on  
Wagon Tire 3 inches  
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AGENTS,  
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Importers of and Dealers in  
Fine Tools,  
Files, Steel Wire, &c.



**LOVEGROVE & CO.,**  
125 N. 4th St., Philadelphia, Pa.,  
Manufacturers of

**Boilers & Engines,**

All styles and sizes.  
Dealers in Steam Pumps, Machinery, Wrought  
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Send for price lists. Medal and Premium awarded at  
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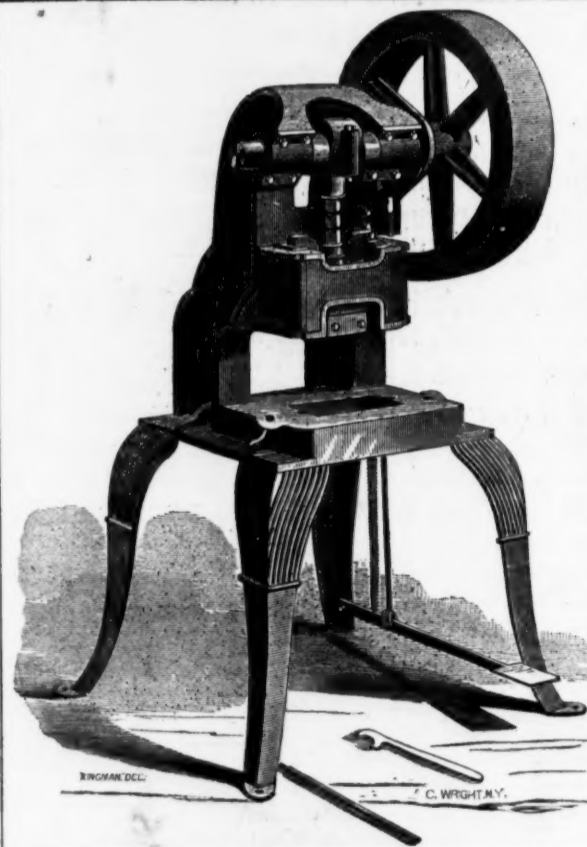


AND  
**PUNCHES**

For  
Raising Heavy Weights,  
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**HYDRAULIC PRESSES**


On hand and made to order.  
Second-Hand Hydraulic Presses  
Bought and Sold.  
Machinery for Polishing and  
Buffing Metals.  
Send for Circular.  
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**BLISS & WILLIAMS,**  
Manufacturers of all kinds of  
**PRESSES, DIES, & SPECIAL MACHINES,**  
FOR WORKING SHEET METALS, &c.  
167 to 173 Plymouth Street, Cor. of Jay, Brooklyn, N. Y.

**SNYDER'S LITTLE GIANT STEAM ENGINE**

The Best  
SMALL  
POWER ENGINES  
IN THE COUNTRY.




Manufactured by  
**WARD B. SNYDER,**  
94 Fulton Str.,  
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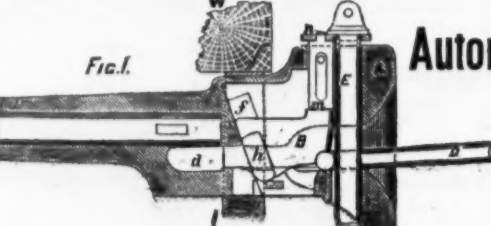
One-Horse Power, with tubular  
boiler, complete, only...\$150.  
Two-Horse Power.... 200.  
Three-Horse Power...250.

Call and Examine  
OR SEND FOR  
AN  
ILLUSTRATED  
CATALOGUE.

ESTABLISHED 1855.  
**Philadelphia Rivet Works,**  
**CHARLES B. ALLEN,**  
Seventeenth and Hamilton Streets,  
PHILADELPHIA.



The undersigned begs leave to inform his former customers, consumers of and dealers in rivets generally, that he has resumed the manufacture of  
**BOILER, BRIDGE and SHIP RIVETS**  
at the above location, where he will keep constantly on hand a large assortment of all the regular sizes.  
Special sizes made to order.  
Particular attention paid to the selection of the best quality of iron. A share of your patronage will be thankfully received.  
Yours, respectfully,  
**CHAS. B. ALLEN.**



**LAHAYE'S  
Automatic Car Coupler.**  
Adopted on many of the leading  
railways, and approved wherever  
used.  
See The Iron Age of Dec. 23, 1876.  
For particulars address the Patentee,  
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OLIVER'S CHILLED PLOWS.

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It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to the collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

### Reduced Price List, FEBRUARY 1, 1877.

For dimensions of Governor, see Illustrated Price List.



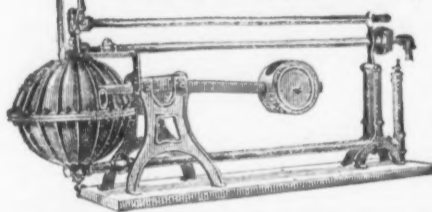
THE JUDSON PATENT Improved Steam Governor.

Size, Inch.	Pair.	Single.	Pair.	Single.
1 1/2	\$16.00	\$18.00	\$1.50	..
1 3/4	14.00	20.00	1.50	..
2	21.00	22.00	2.00	\$5.00
2 1/4	23.00	26.00	2.25	6.00
2 1/2	26.00	30.00	2.50	8.00
2 3/4	31.00	35.00	2.75	10.00
3	36.00	41.00	3.25	12.00
3 1/4	40.00	45.00	3.50	14.00
3 1/2	45.00	51.00	3.75	16.00
3 3/4	50.00	57.00	4.25	19.00
4	59.00	67.00	4.50	22.00
4 1/4	69.00	78.00	5.00	28.00
4 1/2	80.00	90.00	5.50	34.00
5	90.00	101.00	6.00	40.00
5 1/2	105.00	117.00	6.50	46.00
6	130.00	135.00	7.00	54.00
6 1/2	142.00	156.00	8.00	65.00
7	175.00	192.00	9.00	79.00
8	198.00	218.00	10.00	..
10	210.00	240.00	12.00	..

No Charge for Boxing & Cartage.

JUNIOR JUDSON & SON, Rochester, N. Y.

## The Albany Steam Trap.



This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company, Albany, N. Y.

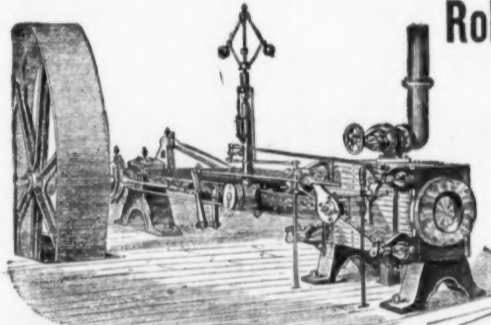
## The Pratt & Whitney Co., Hartford, Conn.,

Have constantly on hand and making

### Drop Hammers



Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



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### Corliss Engine BUILDERS.

Shafting & Gearing. Boiler Makers.

## THORNE, DeHAVEN & CO., Drilling Machines,

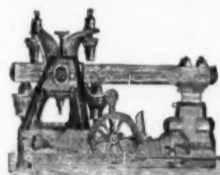
21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction. RADIAL DRILLS. Self-feed—Large Adjustable Box Table. VERTICAL DRILLS. Self-feed. MULTIPLE DRILLS. 2 to 20 Spindles. HORIZONTAL BORING AND DRILLING MACHINES. HAND DRILLS. CAR BOX DRILLS. SPECIAL DRILLS. For Special Work.

H. H. HARVEY'S HAMMER AND TOOL WORKS, Augusta, Me.



SPECIALTIES.—Stone Cutters' Hammers and Tools, Quarrymen's Drills, Wedges and Half Rounds, &c., &c., &c. Miners' Hammers and Tools, Patent Hammers for picking burr stone. Also the common Mill Picks and Wood wedges Steel or Iron, 1/2 lb. Solid eye Picks, with one lb. of best Cast Steel inserted in each pick. The above goods are warranted inferior to none, both in quality and style of finish. All hammers have true eyes and polished faces, and are made from solid cast steel. No charge is made for boxing or carting at Augusta; shipping facilities are excellent. Hammers made to any pattern or drawing. Capacity of works, one ton of hammers per day. A full line of the above goods constantly in stock. Catalogue on application.



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Has Won Golden Opinions from the Mechanical World during the four years it has been before the public, and has reached a sale of 300 Hammers, all in successful operation, in this and foreign countries. It Has More Good Points, Less Complication, More Adaptability, Larger Capacity, Does More and Better Work, Takes Less Power, Costs less for Repairs than any Hammer in the World. GUARANTEED AS REPRESENTED, and "DON'T YOU FORGET IT."

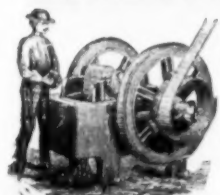
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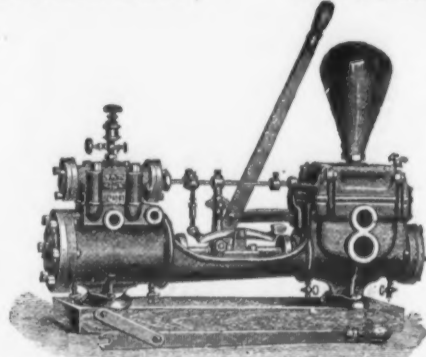
## Knowles Patent Steam Pumps

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### KNOWLES STEAM PUMP WORKS, WARREN, MASS.

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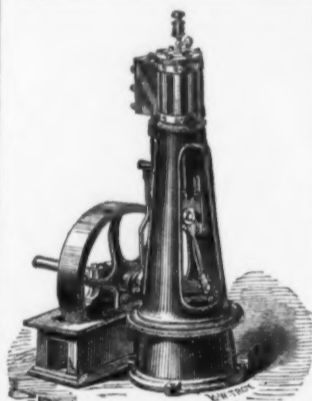
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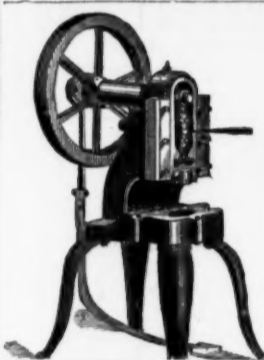
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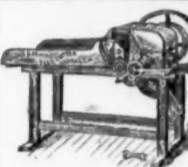
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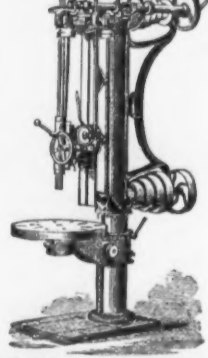
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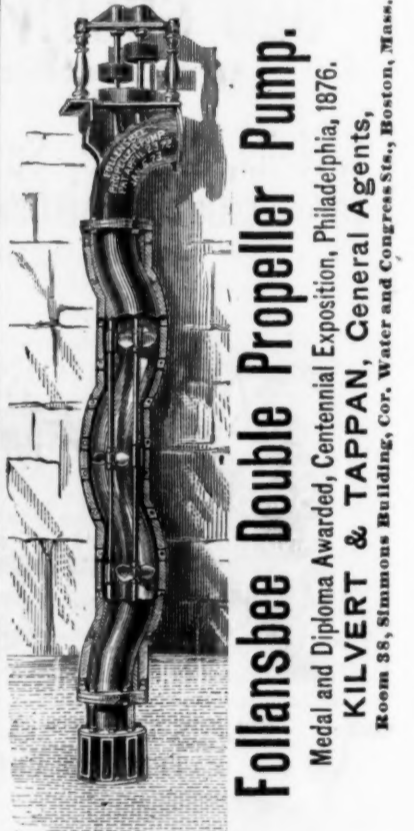


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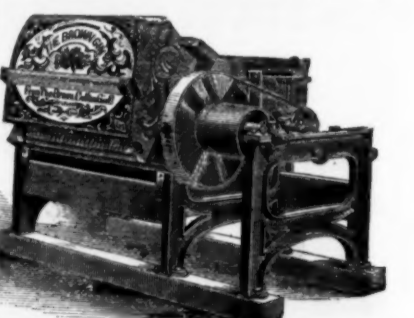
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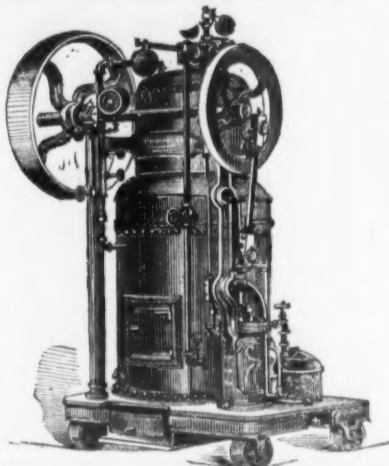
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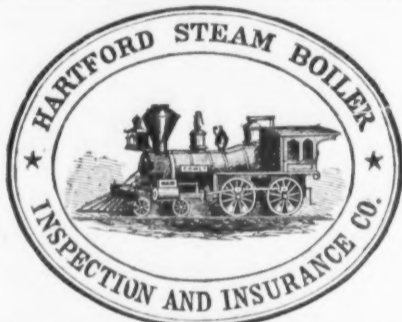
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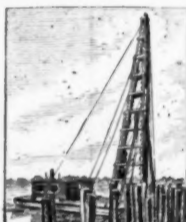
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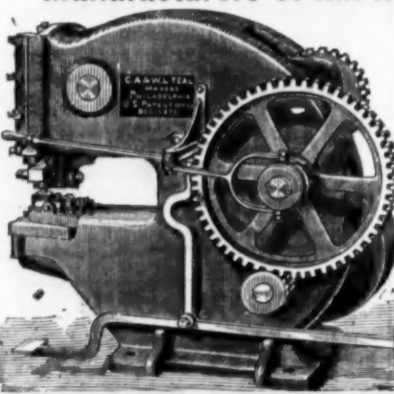
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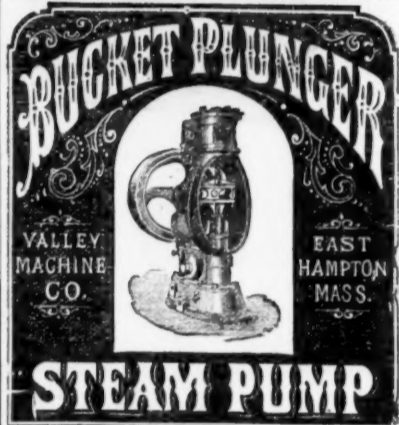
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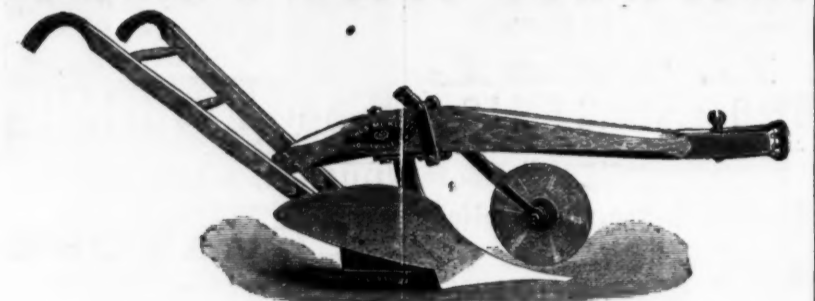
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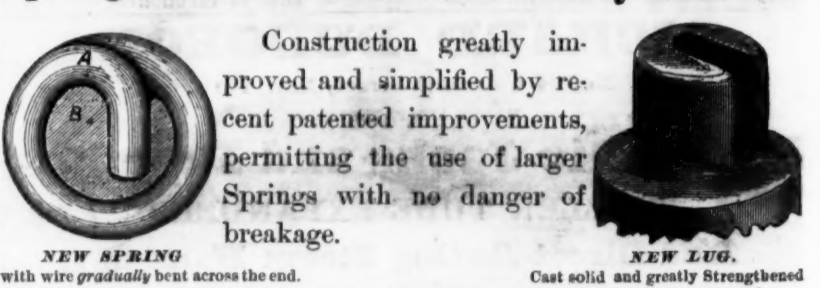
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